

No. 23-1078 (L) (2:21-cv-00316)

**IN THE
UNITED STATES COURT OF APPEALS
FOR THE FOURTH CIRCUIT**

B.P.J., by her next friend and mother; HEATHER JACKSON,

Plaintiff - Appellant,

versus

WEST VIRGINIA STATE BOARD OF EDUCATION; HARRISON
COUNTY BOARD OF EDUCATION; WEST VIRGINIA SECONDARY
SCHOOL ACTIVITIES COMMISSION; W. CLAYTON BURCH, in his
official capacity as State Superintendent; DORA STUTLER, in her official
capacity as Harrison County Superintendent,

Defendants - Appellees.

and

THE STATE OF WEST VIRGINIA; LAINEY ARMISTEAD,

Intervenors - Appellees

On Appeal from the United States District Court for the Southern District of
West Virginia (Charleston Division)
The Honorable Joseph R. Goodwin, District Judge
District Court Case No. 2:21-cv-00316

JOINT APPENDIX – VOLUME 5 OF 9 (JA2153-JA2566)

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Errata Sheet to Deposition of Dr. Joshua Safer, M.D. [Armistead App.1535-1537] in Appendix to Defendant-Intervenor's Motion for Summary Judgment	3/22/2023	529	JA4634
Redacted Harrison County Board of Education Document Production [Armistead App.1538-1553] [HCBOE 01167-01172] in Appendix to Defendant-Intervenor's Motion for Summary Judgment	3/22/2023	529	JA4637
Redacted Harrison County Board of Education Document Production [Armistead App.1544-1547] [HCBOE 01265-01268] in Appendix to Defendant-Intervenor's Motion for Summary Judgment	3/22/2023	529	JA4643
Redacted Amended Birth Certificate of B.P.J.	N/A	N/A	JA4647

1 IN THE UNITED STATES DISTRICT COURT
2 FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA
3 * * * * *
4 B.P.J., by her next friend and *
5 mother, HEATHER JACKSON, *
6 Plaintiffs * Case No.
7 vs. * 2:21-CV-00316
8 WEST VIRGINIA STATE BOARD OF *
9 EDUCATION, HARRISON COUNTY BOARD OF*
10 EDUCATION, WEST VIRGINIA SECONDARY *
11 SCHOOL ACTIVITIES COMMISSION, W. *
12 CLAYTON BURCH in his official *
13 capacity as State Superintendent, *
14 and DORA STUTLER in her official *
15 capacity as Harrison County *
16 Superintendent, PATRICK MORRISEY in*

17
18 VIDEOTAPED DEPOSITION OF
19 JOSHUA SAFER, M.D.
20 March 24, 2022
21

22 Any reproduction of this transcript
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24 by the certifying agency.

1 his official capacity as Attorney *

2 General, and THE STATE OF WEST *

3 VIRGINIA, *

4 Defendants *

5 * * * * *

6

7 VIDEOTAPED DEPOSITION OF

8 JOSHUA SAFER, M.D.

9 March 24, 2022

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VIDEOTAPED DEPOSITION

OF

JOSHUA SAFER, M.D., taken on behalf of the Intervenor
herein, pursuant to the Rules of Civil Procedure, taken
before me, the undersigned, Nicole Montagano, a Court
Reporter and Notary Public in and for the Commonwealth
of Pennsylvania, taken via videoconference, on
Wednesday, March 24, 2022 at 9:30 a.m.

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1 S T I P U L A T I O N

2 -----
3 (It is hereby stipulated and agreed by and between
4 counsel for the respective parties that reading,
5 signing, sealing, certification and filing are not not
6 waived.)
7 -----

8 P R O C E E D I N G S
9 -----

10 MR. BABWAH: My name is Brandon Babwah.
11 I'm a notary public out of the State of New York.

12 VIDEOGRAPHER: We are now on the record.
13 My name is Jacob Stock. I'm a Certified Legal Video
14 Specialist employed by Sargent's Court Reporting
15 Services. The date today is March 24th, 2022. The
16 current time on the video monitor reads 9:17 a.m.
17 Eastern Standard Time. This deposition is taken
18 remotely by videoconference. The caption of this case
19 is the United States District Court for the Southern
20 District of West Virginia at Charleston, BPJ, et al.
21 versus West Virginia State of Board of Education, et
22 al., Civil Action No. 2:21-cv-00316. The name of the
23 witness is Joshua Safer. Will the attorneys present
24 state their names and the parties they represent?

1 ATTORNEY BROOKS: Roger Brooks for the
2 Intervenor, Lainey Armistead, in the room --- in the
3 conference room with the witness. With me is my
4 colleague, Lawrence Wilkerson.

5 ATTORNEY HOLCOMB: Christiana Holcomb for
6 the Intervenor.

7 ATTORNEY TRYON: This is David Tryon
8 representing the State of West Virginia. I'm with the
9 Attorney General's Office.

10 ATTORNEY MORGAN: This is Kelly Morgan on
11 behalf of the West Virginia Board of Education and
12 Superintendent Burch.

13 ATTORNEY DENIKER: Good morning. Susan
14 Deniker representing Harrison County Board of Education
15 and Superintendent Dora Stutler.

16 ATTORNEY GREEN: Roberta Green here on
17 behalf of West Virginia Secondary School Activities
18 Commission.

19 ATTORNEY BLOCK: For the Plaintiff in the
20 room is Josh Block from the ACLU.

21 ATTORNEY SWAMINATHAN: And you have Sruti
22 Swaminathan from Lambda Legal.

23 ATTORNEY HARTNETT: Good morning. This
24 is Kathleen Hartnett from Cooley for the Plaintiff.

1 ATTORNEY BARR: This is Andrew Barr from
2 Coley for Plaintiff.

3 ATTORNEY KANG: Good morning. This is
4 Katelyn Kang from Cooley for the Plaintiff.

5 ATTORNEY HELSTROM: Hello. This is Zoe
6 Helstrom from Cooley for Plaintiff.

7 VIDEOGRAPHER: And if that's everyone,
8 may I ask the notary to swear in the witness?

9 ---

10 JOSHUA SAFER, M.D.,
11 CALLED AS A WITNESS IN THE FOLLOWING PROCEEDING, AND
12 HAVING FIRST BEEN DULY SWORN BY A NOTARY PUBLIC,
13 TESTIFIED AND SAID AS FOLLOWS:

14 ---

15 VIDEOGRAPHER: May I also ask the notary
16 to identify himself for the record as well?

17 NOTARY: My name is Brandon Babwah.

18 VIDEOGRAPHER: And at this time the
19 notary may be dismissed and we can begin.

20 ATTORNEY BROOKS: Thank you. And thank
21 you all for making all this complicated stuff work.

22 ---

23 EXAMINATION

24 ---

1 BY ATTORNEY BROOKS:

2 Q. Doctor Safer, good morning. I want to first put
3 in front of you your expert report and your rebuttal
4 report so that you have those if at any point you want
5 to refer to them. It looks --- for convenience let's
6 mark those as Exhibit 1 and 2 for the deposition.

7 ATTORNEY TRYON: Roger, one moment. I'm
8 looking at the realtime, and it's recording you as
9 Attorney Capehart. So I don't know if that needs to be
10 corrected now. And it's showing me as Attorney
11 Hartnett.

12 ATTORNEY BROOKS: She will get that fixed
13 and the record will be correct.

14 ATTORNEY TRYON: Okay.

15 ---

16 (Whereupon, Exhibit 1, Report of Dr. Safer,
17 was marked for identification.)

18 (Whereupon, Exhibit 2, Rebuttal Report of
19 Dr. Safer, was marked for identification.)

20 ---

21 ATTORNEY BROOKS: And at the moment I'm
22 handing copies to the witness. And I would like to mark
23 as Safer Exhibit 3 a short article entitled Fairness for
24 Transgender People in Sport by Joshua Safer.

1 ATTORNEY WILKINSON: Tab 82.

2 ---

3 (Whereupon, Exhibit 3, Fairness for
4 Transgender People in Sports Article, was
5 marked for identification.)

6 ---

7 ATTORNEY BROOKS: And the court reporter
8 will hand the stamped copy to the witness; am I correct?

9 BY ATTORNEY BROOKS:

10 Q. And Doctor Safer, I will ask you questions if
11 you go about your expert reports but let me ask you now
12 to focus your attention on Exhibit Number 3. Am I right
13 that this is an article that you have just very recently
14 published?

15 A. Yes.

16 Q. When did this come out?

17 A. This came out within the past few weeks I think.

18 Q. And this is not a recording of the original
19 research. This is a two page piece simply explaining
20 current issues to the readership of this journal?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: So this is not original
23 research, that's correct.

24 ATTORNEY BROOKS: Thank you.

1 BY ATTORNEY BROOKS:

2 Q. How would you describe the purpose of this
3 article?

4 A. The purpose of this article is to educate
5 endocrinologists, frame the issues and also serves a bit
6 as a charge to endocrinologists in terms of work that
7 needs to be done.

8 Q. Thank you. If you look at the first column of
9 the first page, in the third paragraph you will see it
10 begins a possible tension exists because of the
11 observation that on average cisgender boys and men have
12 better performance outcomes in athletics than do
13 cisgender girls and women. Do you see that language?

14 A. I do.

15 Q. And you are referring there to the general
16 observation that natal males have better average
17 athletic performance than natal females in a variety of
18 measures.

19 Correct?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So I guess I need to be
22 more specific or I can clarify.

23 BY ATTORNEY BROOKS:

24 Q. If you would be more specific.

1 A. So cisgender men at a certain age have better
2 sports outcomes than cisgender women.

3 Q. But you wrote in this just published article
4 that cisgender boys and men have better performance
5 outcomes than the cisgender girls and women.

6 Correct?

7 A. That is correct.

8 Q. And what did you mean in that statement by your
9 reference to boys and girls?

10 A. Boys and girls who are basically --- it depends,
11 it's context I guess. So boys and girls who are
12 developed to that point.

13 Q. So those --- what you had in mind are boys and
14 girls, once the puberty process begins in males in
15 particular?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: Yes, I guess I would say
18 that what we know is what is towards the end of puberty
19 and subsequent development beyond puberty.

20 BY ATTORNEY BROOKS:

21 Q. You say in the next sentence --- well, let me
22 just clarify, you accept as a scientific fact the
23 general observation that, on average, boys and men,
24 defining boys as you just did, have significantly

1 stronger athletic performance in a variety of metrics
2 than girls and women as you just defined girls; correct?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: So I guess how I would say
5 that is I accept as fact that men and boys who are
6 appropriately developed have, yeah, have bad performance
7 outcomes in certain sports than do cisgender women and
8 cisgender girls again appropriately developed.

9 BY ATTORNEY BROOKS:

10 Q. And the next sentence reads the performance
11 difference has resulted in the establishment of female
12 only divisions for sport participation for girls and
13 women and safely compete in the live events, closed
14 quote. Do you see that language?

15 A. I do.

16 Q. And there you were, am I correct, explaining the
17 relationship of your observation about male performance
18 with the existence in our society of sex-separated
19 sports.

20 Correct?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: So I guess --- I would
23 think the way I would say it myself is this is a ---
24 this is the reason why we have the carve-out for the

1 female category.

2 BY ATTORNEY BROOKS:

3 Q. And one reason is to give cisgender girls and
4 women an opportunity to, quote, reliably win events.

5 Correct?

6 ATTORNEY BLOCK: Objection.

7 COURT REPORTER: I'm sorry, Counsel, I
8 can't hear you.

9 BY ATTORNEY BROOKS:

10 Q. One reason, according to what you've written in
11 this article, that there have been a carve-out in a
12 separate female division is to provide girls and women
13 with opportunities to, quote, reliably win events,
14 closed quote.

15 Correct?

16 A. So I guess the way I would say it is if we are
17 going to be really careful with the language here that
18 it would be on average to reliably win events, that is
19 --- yeah, I will leave it at that.

20 Q. Certainly not every girl and women is going to
21 win events, as I know as a male who never won an event?

22 A. Exactly.

23 Q. And another reason, according to this sentence
24 that you wrote, for having a separate category for girls

1 and women is so that they can, quote, safely compete.

2 Correct?

3 A. The word safely in that context is kind of ---
4 accentuates reliably.

5 Q. And you wrote in the next sentence that, quote,
6 the female-only divisions are a major factor to
7 encourage greater participation of girls and women in
8 sports with a goal of equal participation rates.

9 Do you see that language?

10 A. I do.

11 Q. And can you explain to me what you understand or
12 what you were trying to explain as the relationship
13 between having a separate female category on the one
14 hand and encouraging greater participation by women and
15 girls on the other?

16 A. Some of the goals of the people who are in sport
17 who organize sport are to get as high fractions of the
18 population to participate as can be encouraged to do so
19 for sheer health of those individuals and then of
20 everybody. And so the purpose of the carve-out then in
21 these circumstances is to encourage girls and women to
22 participate in larger numbers than they might otherwise.

23 Q. And do you have an opinion, do you have an
24 expert opinion as to whether the existence of separate

1 categories for female sports has in fact been a, quote,
2 major factor in encouraging greater participation by
3 women and girls in sport?

4 A. I don't have an expert opinion.

5 Q. You don't know whether that is objectively true
6 or not?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: I don't --- right, I can't
9 state as an expert on the details of that subject,
10 that's right.

11 BY ATTORNEY BROOKS:

12 Q. On the second column, in the --- the first full
13 sentence begins many hormone related. Do you see that?

14 A. Yes, I do.

15 Q. Let me read that sentence into the record.
16 Quote, many hormone-related physical characteristics
17 acquired during puberty are not reversed if hormone
18 levels are changed later in life. Can you tell us what
19 physical characteristics associated with typical male
20 development are in your opinion not reversed if hormone
21 levels are changed later in life?

22 A. Again, so I don't know that I would off the top
23 of my head give an exhaustive list but a classic would
24 be height.

1 Q. Would you --- I understand your list may not be
2 exhaustive, but let me ask you to tell us all the
3 examples as you're able to sit here thinking today of
4 physical characteristics acquired during male puberty
5 that are not reversed if hormone levels are changed
6 later in life.

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: I don't know that I could
9 --- I don't know that I would want to accidentally go
10 down that path and conjecture too much, but if I'm
11 expanding a bit on height and thinking about bone
12 characteristics, especially there might be modest change
13 but significant residual bone would be the biggest
14 example. And some other elements --- I can't even say I
15 was about to say a bit proportional, but it's more
16 complicated than that, so other --- other tissues partly
17 influenced by that fact.

18 BY ATTORNEY BROOKS:

19 Q. If we jump down to the next paragraph it begins,
20 quote, the questions arise most with transgender women
21 who began hormone treatment after puberty. And then it
22 continues, quote, the situation includes most
23 transfeminine people because it is most common to
24 undergo endogenous puberty prior to seeking medical

1 interventions appropriate to gender identity. Have I
2 read that correctly?

3 A. Yes.

4 Q. And is it consistent with your experience that
5 most natal males who seek what you refer to as gender
6 confirming treatment do so after experiencing at least
7 most of the ordinary male puberty?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: Yes. So just terminology,
10 just to be clear, so people who are recorded male at
11 birth who are looking for gender affirming is the term
12 but gender confirming is fine. And sorry, the question
13 there?

14 BY ATTORNEY BROOKS:

15 Q. I will ask it again. Is it consistent with your
16 personal experience that most natal males who seek
17 gender affirming treatment present after undergoing at
18 least most of a natural male puberty?

19 ATTORNEY BLOCK: Same objection to
20 terminology.

21 THE WITNESS: Yes. So most transgender
22 women who come seeking medical treatment have gone
23 through a typical male puberty, that is correct, right
24 now.

1 BY ATTORNEY BROOKS:

2 Q. And in your clinic most of them have gone
3 through what you would consider to be a complete male
4 puberty process?

5 A. I can't answer that completely because we define
6 puberty in this narrow way with the Tanner stages, but
7 then people continue to have development even beyond
8 that to a significant degree.

9 Q. But they have experienced, in your professional
10 experience, at least the bulk of the pubertal changes?

11 A. Yes, I mean the --- I guess --- the way I would
12 say it is, is that most of the transgender women who are
13 coming or even girls who are coming for medical
14 attention have gone through the classic Tanner stages of
15 puberty through Tanner five, which is the last one, by
16 the time they have determined that they're interested in
17 gender-affirming treatment, yes.

18 Q. And let's go back to the very first paragraph of
19 your article in which you mention about five lines down,
20 quote, concern for possible residual athletic advantages
21 from a history of typical male puberty, closed quote.
22 Do you see that language?

23 A. Let me find it. Where is it?

24 Q. It's about five lines down on the very first

1 paragraph of the article.

2 A. Oh, the middle of the sentence, exactly.

3 Q. And so in your opinion, it is concern for
4 possible residual athletic advantages from a history of
5 typical male puberty that drives a great deal of concern
6 about how to address inclusion of natal males who
7 experience a female gender identity in female athletics.

8 Am I correct?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: So the concern about the
11 residual impact of testosterone during puberty for
12 transgender women who went through a typical male
13 puberty is the source of --- right, is a source of
14 tension at a medical sensitive level, yes.

15 BY ATTORNEY BROOKS:

16 Q. And that's an issue that, for instance, you
17 engage in extensive discussions about in connection with
18 your service on the committee for the IAAF.

19 Am I correct?

20 A. So the --- right, the conversation at World
21 Athletics now, but formerly IAAF, has dealt and I'm sure
22 will continue to deal with that which is the question of
23 to what degree are some of those characteristics, a
24 cause for relevant athletic advantage.

1 Q. And in your opinion, concern about possible
2 residual athletic advantages resulting from a history of
3 typical male puberty is legitimate concern.

4 Right?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: Right. I don't know that
7 I'm as an expert commenting on its legitimacy. My role
8 on the committee is talking about what is.

9 BY ATTORNEY BROOKS:

10 Q. Do you have any expert opinion as to whether
11 concern for possible residual athletic advantages from a
12 history of typical male puberty is a legitimate concern?

13 A. I'm sorry. Say that again.

14 Q. Do you have any expert opinion as to whether
15 concern for possible residual athletic advantage from a
16 history of a typical male puberty is a legitimate
17 concern?

18 A. I don't know that I would --- again, I don't
19 know that I'm an expert on what is legitimate or not. I
20 come into the room as the scientist talking about what
21 is true and what is not true, what do we know and what
22 do we not know.

23 Q. So on the question then after the science has
24 been put on the table as to how to balance that with

1 other considerations of fairness, of inclusion, that is
2 not your expertise is what you are telling me?

3 A. That is right, that is not my expertise.

4 Q. If we go to page two, in the first column, the
5 second full paragraph begins because testosterone. Do
6 you see that paragraph?

7 A. I do.

8 Q. And you discuss there World Athletic
9 requirements, that is the former IAAF I believe you just
10 testified?

11 A. Yes.

12 Q. And the World Athletics has adopted a
13 requirement to suppress testerone (sic) to five
14 nanomolar per liter testosterone.

15 Correct?

16 A. World Athletics threshold is five nanomolar per
17 liter for those sports where they have a threshold.
18 That's right, yes.

19 Q. And at least formally the International Olympic
20 Committee had a ten nanomolar threshold as part of what
21 you would call out in this paragraph.

22 Is that correct?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: Yes. So it was the case

1 that the International Olympic Committee Medical Group
2 was trying to form a unified approach just for purposes
3 of organization. And at that time a ten nanomolar per
4 liter suggestion was put out. And that is about as far
5 as it got because it then was shifted to all of the
6 individual international federations.

7 BY ATTORNEY BROOKS:

8 Q. You say in the final sentence of that paragraph,
9 quote, such thresholds are considered to be fair to
10 transgender women because they are well above the 1.7
11 nanomolar per liter target testosterone threshold in
12 medical treatment guidelines, closed quote.

13 Do you see that language?

14 A. Yes.

15 Q. Am I correct that in your professional
16 understanding the 1.7 nanomolar per liter target is set
17 because that's generally believed to be at the upper
18 range of testosterone levels in normal, healthy females?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: So the 1.7 nanomolar per
21 liter target is the upper level for adults cisgender
22 women.

23 BY ATTORNEY BROOKS:

24 Q. And with that clarified, can you explain to me

1 what you meant by the sentence that I just read, what
2 the point is there?

3 A. The point of the sentence is to --- I guess
4 there are a couple of considerations in terms of
5 determining these numbers, but --- so part of the point
6 is to identify numbers that are feasible for transgender
7 women on their medical treatment.

8 Q. Is there some other point to this sentence in
9 your understanding as it is offered?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: So the sentence references
12 that piece, but there is the additional context of
13 having a number that is fair to the greater female
14 committee cisgender and transgender too.

15 BY ATTORNEY BROOKS:

16 Q. So it's fair in your judgment to transgender
17 women because the threshold that is being set gives,
18 what should we say, plenty of buffer above what is
19 considered to be the upper range of normal female
20 testosterone levels?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: Right. So I'm not taking a
23 position on what is fair to be clear.

24 BY ATTORNEY BROOKS:

1 Q. Thank you.

2 A. But the concept of those in the room making that
3 distinction felt that this cutoff would be fair because
4 there would be, indeed, create some buffer and,
5 therefore, people who weren't perfectly at goal would
6 still be included.

7 Q. So because this may be important, let me
8 clarify, when you wrote such thresholds are considered
9 to be fair, you were not offering a personal opinion
10 about fairness but explaining the judgment that had been
11 made by this committee about fairness?

12 A. That's correct.

13 Q. Thank you. And did it cause you personally any
14 concern that the threshold --- that because the
15 threshold that was set was more than three times higher
16 than the upper bounds of testosterone concentrations in
17 normal healthy women, that that might be unfair to the
18 broader population of cisgender women?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: So to be clear, I'm not
21 rendering an opinion as an expert on what is fair, but I
22 can interpret the considerations of people having these
23 conversations. And so while it is true that the
24 laboratory range for testosterone for healthy cisgender

1 women has an upper limit of 1.7 nanomolar per liter,
2 there are cisgender women who, for a variety of reasons,
3 have numbers higher than that and so that and --- so
4 that is part of the consideration.

5 BY ATTORNEY BROOKS:

6 Q. Let me take you to the two paragraphs below that
7 to the paragraph that begins the societal priorities.
8 Do you see that paragraph?

9 A. I do.

10 Q. The last sentence of that paragraph reads if
11 advantage from testosterone is demonstrated, does
12 society want to implement rules that may indirectly
13 coerce transgender children to begin medical regimens
14 prior to their being ready and that they might never
15 actually choose otherwise, closed quote.

16 Do you see that language?

17 A. I do.

18 Q. Would you explain to me the concern that you are
19 expressing there?

20 A. If a societal goal --- and again here recognize
21 I'm not acting as an expert in this space, but I'm
22 trying to explain to my colleagues what people are
23 discussing. And if our concern is increased
24 participation in sport by various people, then you can

1 envision a circumstance where some girls farther along
2 in puberty have a testosterone advantage that could be
3 demonstrated. Again, not that we even have at this
4 point. And then we would be faced with that question,
5 which is that competing goal of making those transgender
6 girls participate in sports and a recognition if they
7 are sufficiently far along in their development that
8 they may have an advantage if we demonstrate such an
9 advantage.

10 Q. Let me see if I can break that out. Were you
11 talking here about a concern about a hypothetical rule
12 that says to a natal male who identifies as female that
13 you may play if you have suppressed testosterone --- you
14 may play if you have taken puberty blockers at an early
15 age but you may not play if you have not taken puberty
16 blockers from an early stage? Is that the hypothetical
17 structure that you were addressing in this sentence?

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: So the --- it is a
20 hypothetical and it would be that if we make a specific
21 testosterone lowering rule at a scholastic level, might
22 we run into a circumstance where we are encouraging
23 somebody to make medication who might not otherwise take
24 that medication.

1 BY ATTORNEY BROOKS:

2 Q. And staying away from questions of fairness and
3 speaking from what I think is a medical ethics
4 perspective, would you think it raises ethical problems
5 if society were to adopt a rule that permitted certain
6 individuals to compete in female athletics if they had
7 taken puberty blockers but did not permit them to
8 compete with the athletic if they had not taken puberty
9 blockers?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: I think that's beyond where
12 I'm commenting as an expert witness. Some of that
13 decision is a society decision or for other experts.

14 BY ATTORNEY BROOKS:

15 Q. Do you consider yourself to have some expertise
16 on medical ethics?

17 A. Not as an expert.

18 Q. And you don't feel able --- you don't have any
19 opinion as you sit here today as to whether a policy
20 that created incentives for children to begin medical
21 regimes relating to gender transition could raise
22 medical ethical concerns?

23 A. Not as a medical expert, that's right.

24 Q. In the next paragraph --- and I think we said

1 this is just out in the last couple of weeks, this
2 publication.

3 Right?

4 A. It's very fresh. Number five, so yes.

5 Q. I'm not playing memory games. It says at the
6 top advance access publication 17 March 2022?

7 A. Good.

8 Q. So very recent?

9 A. Yes.

10 Q. And you believe you are reasonably current in
11 the science of this area?

12 A. I am reasonably current, indeed.

13 Q. I didn't ask if you know it all because nobody
14 knows it all, but you say at the beginning of this
15 paragraph much remains unknown scientifically. And you
16 continue, quote, for example, at what point in puberty
17 is advantage from testosterone significant. Is there a
18 point where such advantage would outweigh a priority to
19 outweigh all participants --- all to participate in
20 sport of some sort, closed quote.

21 Do you see that language?

22 A. I do.

23 Q. And actually the point in writing the second
24 sentence there --- strike that.

1 Let me just ask this in general. Do you have
2 an opinion as to how much of a performance advantage
3 would count for those --- for natal males versus natal
4 females, how much of a performance advantage would be,
5 quote, significant?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: I do not have an opinion.

8 BY ATTORNEY BROOKS:

9 Q. And in your view, is that even a scientific
10 question?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: Let me think. No, that
13 isn't a scientific question.

14 BY ATTORNEY BROOKS:

15 Q. And you --- and the next sentence is there a
16 point where an advantage, such an advantage would
17 outweigh a priority to motivate all to participate. Am
18 I correct that you also don't consider that to be a
19 scientific question?

20 A. That is correct.

21 Q. That is a value judgment?

22 ATTORNEY BLOCK: Objection to form.

23 THE WITNESS: So it's not a scientific
24 question. I can go a little more in --- I can expand a

1 little bit there which is to say that we have various
2 advantages and degrees of unfairness. So what could be
3 a scientific question, if we knew the answers, would
4 include the degree of advantage for some circumstance
5 versus another circumstance where we are able to measure
6 those things.

7 BY ATTORNEY BROOKS:

8 Q. But the question of whether an advantage on the
9 one hand outweighs a desire to be inclusive on the other
10 hand is a value question, not a scientific question?

11 ATTORNEY BLOCK: Objection to form.

12 BY ATTORNEY BROOKS:

13 Q. In your opinion.

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: So I guess I would just go
16 back to saying how I said it, which is the scientific
17 question in there would be to provide that degree of
18 difference and show, for example, that this would be ---
19 this is small advantages versus someone that we are
20 already do in society as big advantage and that would be
21 how --- that would be the role of the scientist.

22 BY ATTORNEY BROOKS:

23 Q. I understand that's what you would like to say,
24 but my question for you is, in your opinion, is the next

1 step of deciding of whether that advantage which has now
2 been scientifically detailed outweighs a priority to
3 motivate all to participate is a value decision.

4 ATTORNEY BLOCK: Objection to form.

5 THE WITNESS: Yeah, I don't --- I guess I
6 can't as an expert say for certain that in all
7 circumstances that is a value to consider.

8 BY ATTORNEY BROOKS:

9 Q. You continue among your lists of things that
10 are, quote, unknown scientifically, quote, for those who
11 have completed puberty, what duration of
12 testosterone-lowering treatment is sufficient to create
13 a level playing field in a given sport, closed quote.

14 Do you see that?

15 A. Yes.

16 Q. And in your view, the question of what duration
17 of testosterone lowering treatment, if any, can be
18 sufficient to create a level playing field in a given
19 sport is currently unknown scientifically?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: It's unknown scientifically
22 across virtually all sports. What duration of
23 testosterone lowering raises what degree of advantage.
24 It's just at that level. To go to the level playing

1 field is a whole further tier.

2 BY ATTORNEY BROOKS:

3 Q. And in your final paragraph I think you said at
4 the beginning that, in part, this was a call to the
5 field of endocrinology for needed research. In the
6 final paragraph you say, quote, we in the endocrine
7 healthcare community have much work to do to create an
8 evidence base to help guide decision makers so the
9 choices for transgender women in sport are data driven,
10 closed quote.

11 Have I read that language correctly?

12 A. Yes.

13 Q. So it's your view as of 2002 that the data that
14 we have available today are insufficient to enable data
15 driven choices about transgender participation in female
16 athletics.

17 Correct?

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: I would say that in 2022 we
20 have insufficient data to --- how would I say this, we
21 have insufficient data to make rules for, let's say,
22 transgender women, mostly talking about older more
23 developed people, that would address these concerns for
24 participation.

1 BY ATTORNEY BROOKS:

2 Q. Let me ask you to find your initial expert
3 report, which is Exhibit-1, and there I will ask you to
4 turn to paragraph 58. At the beginning of paragraph 58
5 you wrote in this report executed on January 21, 2022,
6 which is two months prior to the publication date of the
7 article we just looked at --- and actually, let me pause
8 and ask you, when did you write the article that we just
9 looked at? And the process always grinds on for a
10 little while. When do you think you substantially
11 completed the task?

12 A. I honestly don't remember.

13 Q. Sorry. The question was when do you think you
14 substantially wrote the text in the article that you
15 just looked at?

16 A. I honestly don't remember the details. We can
17 talk in years, so it would be 2022 and back into 2021.

18 Q. Okay.

19 So about the same time that you were preparing
20 this expert report?

21 A. There certainly would be some overlap.

22 Q. You wrote in paragraph 58, quote, even if
23 evidence were eventually to show that on average
24 transgender women have some level of advantage compared

1 to average non-transgender women, closed quote.

2 Do you see that language?

3 A. I do.

4 Q. Now, in fact, you are aware of substantial
5 evidence that, on average, transgender women do have
6 some level of advantage compared to advantage
7 non-transgender women.

8 Correct?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: No, I'm not. So that isn't
11 my statement.

12 BY ATTORNEY BROOKS:

13 Q. And is the question --- so you served on the
14 IAAF Committee discussing questions of testosterone
15 levels. And in that context you did not become
16 acquainted with data showing that on average transgender
17 women have some level of advantage compared to average
18 non-transgender women?

19 A. Not in --- so, no. In the context of specific
20 sports, no.

21 Q. Do you consider the question of how much
22 advantage natal males have over natal females in
23 particular sports to be within your professional
24 expertise?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: So sorry --- so cisgender
3 men versus cisgender women, that difference at an adult
4 level, is at my expertise to know that degree of
5 difference? Is that the question?

6 BY ATTORNEY BROOKS:

7 Q. It is.

8 A. No, that is not my expertise.

9 Q. And is it within your expertise to know the
10 level of advantage enjoyed by natal males who have
11 transitioned to female gender identity over cisgender
12 women in any particular sport?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: So in the --- so if we are
15 talking cisgender women versus transgender women, it
16 would be in my expertise to know what data we have on
17 this subject, which is different from knowing the degree
18 of difference because we don't have those data.

19 BY ATTORNEY BROOKS:

20 Q. You say in paragraph 60, let me find this,
21 quote, there is no inherent reason why transgender women
22 physiological characteristics related to athletic
23 performance should be treated as any more of an unfair
24 advantage than the advantages that already exist among

1 different women athletes. Do you see that language?

2 A. I do.

3 Q. Now, earlier you told me rather emphatically
4 that the question of fairness is outside your
5 professional expertise.

6 Correct?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: It is outside my expertise.

9 BY ATTORNEY BROOKS:

10 Q. So why did you offer here an opinion about what
11 is fair or unfair?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: Right. So I'm not
14 determining the fairness per se as an expert, but I'm
15 simply talking about the inputs where somebody who is
16 determining what is fair --- where somebody is
17 determining what is fair would consider.

18 ATTORNEY BROOKS: Let me mark as Safer
19 Exhibit 4 an article by Professor Handelsman entitled
20 Circulating Testosterone on a Hormonal Basis of Sex
21 Differences in Athletic Performance.

22 ---

23 (Whereupon, Exhibit 4, Professor Handelsman
24 Article, was marked for identification.)

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ATTORNEY WILKINSON: Tab 18.

VIDEOGRAPHER: I'm sorry, what tab is it?

ATTORNEY BROOKS: Tab 18.

BY ATTORNEY BROOKS:

Q. And Doctor Safer, am I correct this is an article that you read with some care?

A. This is an article that I read with some care.

Q. You cited in your expert report.

Correct?

A. I think so.

Q. I think so, too. It's not a memory test. I retract the question. We will come to it shortly.

Let me ask you to turn in --- and let me ask you, do you know Professor Handelsman personally?

A. I do not.

Q. Have you encountered him in any other actions?

A. I have.

Q. Once, more than once?

A. That is also a trick question for me. For sure once.

Q. Okay.

Do you consider him to have a high reputation in the field?

1 A. If that question is as an expert I can't --- I
2 won't comment, but he certainly has published widely and
3 we quote him.

4 Q. What do you mean by we in that answer?

5 A. The rest of us in the field and I certainly
6 quote him in an expert opinion.

7 Q. All right.

8 And this article in particular we note you
9 widely reference?

10 A. This article is --- yeah, I think that is
11 actually a fair thing to say. It is as widely
12 referenced as anything in a relatively small field.

13 Q. Let me ask you to turn to the second page of
14 this article where Professor Handelsman in the first
15 full paragraph --- the second full paragraph begins
16 nevertheless. He says, quote, fairness is an elusive
17 subjective concept with malleable boundaries that may
18 change over time as social concepts of fairness evolve.

19 Do you see that?

20 A. I do.

21 Q. Do you agree with that statement?

22 A. As an expert I can't comment.

23 Q. You don't purport to be able to give any
24 definition of fairness?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: Yes, not as an expert.

3 BY ATTORNEY BROOKS:

4 Q. And you don't have any opinion as to whether
5 standards of fairness can change over time?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: I'm aware of the
8 conversation on the subject, of course, but if you are
9 asking me to comment as an expert, then no.

10 BY ATTORNEY BROOKS:

11 Q. If the actual evidence shows that the actual
12 scientific data were to show that, quote, on average
13 transgender women have, closed quote, a very large
14 advantage compared to average non-transgender women,
15 would you then have any view as to whether permitting
16 non-transgender women to compete in female categories is
17 fair?

18 ATTORNEY BLOCK: Objection to form. I'm
19 sorry, what's the quotation?

20 BY ATTORNEY BROOKS:

21 Q. If actual data were to show that on average
22 transgender women have a very large advantage compared
23 to non-transgender women, then would you have any
24 opinion as to whether it is fair to permit the

1 transgender women to compete in the female category?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: No, that would not change.

4 I would simply as an expert I would talk about those
5 degrees of difference as information.

6 BY ATTORNEY BROOKS:

7 Q. But you would offer no opinion as to whether
8 permitting the participation in the female category was
9 or was not appropriate?

10 A. I would not offer an expert opinion. That's
11 right.

12 Q. Now, you say in paragraph 60 of your expert
13 record that there is, quote, no inherent why transgender
14 women's physiological characteristics related to
15 athletic performance should be treated as any more of an
16 unfair advantage than the advantages that already exist
17 among different women athletes, close quote. We have
18 looked at that language.

19 Correct?

20 A. You are reading that correctly.

21 Q. Thank you.

22 A. Whatever the question is.

23 Q. No question beyond that so far. And your point
24 I take it is that for any given sport some women just

1 have substantially more favorable physiques than others?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: Right. So for any given
4 sport some women have advantages relatively to others,
5 yes.

6 BY ATTORNEY BROOKS:

7 Q. And in basketball some are simply genetically
8 going to be substantially taller than others?

9 A. In basketball some are taller than others, yes.

10 Q. I'm not speaking for you, I, at 5'8", in my
11 shoes for instance was --- am just physiologically
12 disadvantaged for basketball compared to a man who is
13 6'10"?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: So as an expert I actually
16 wouldn't go there because there are other
17 characteristics in basketball per se.

18 BY ATTORNEY BROOKS:

19 Q. That's true, although I have none of them. But
20 is it, in your view, equally true that there is no
21 inherent reason why cisgender men's physiological
22 characteristics related to athletic performance should
23 be treated as any more of an unfair advantage for
24 competing in the women's category than the advantages

1 that already exist among different women athletes?

2 A. So yeah, let's go through this more slowly a
3 second so I'm clear.

4 Q. All I did was substitute cisgender men for
5 transgender women in that sentence. And my question is
6 doesn't your argument as stated there apply exactly with
7 equal force to cisgender male?

8 A. No.

9 Q. Why is that?

10 A. When we talk about --- when we're talking about
11 a range of characteristics among a range of people
12 versus something that might be systematically true or
13 not and so it just --- so the answer just ends up being
14 more complex.

15 Q. Well, you have testified that most natal women
16 --- pardon me, you testified that most natal males with
17 female gender identity have undergone at least the
18 majority of male puberty before they present for gender
19 affirming treatment.

20 Correct?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: So most cisgender women
23 when they come to medical attention have gone through a
24 significant puberty, the five Tanner stages.

1 BY ATTORNEY BROOKS:

2 Q. And just to clarify, to use your terms, in
3 giving that answer you said cisgender women. That is
4 not what you meant.

5 Correct?

6 A. That is not what I meant, thank you.
7 Transgender women.

8 Q. And therefore, they systematically have gone
9 through --- systematically gone through physiologic
10 changes associated with male puberty?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: So the --- so they --- they
13 have gone through male puberty. And there is something
14 on average that may be true there, but whether that
15 relates to an advantage in a specific sport I can't go
16 there.

17 BY ATTORNEY BROOKS:

18 Q. Well, the example that you gave earlier of a
19 systematic difference resulting from male puberty that
20 these transgender women enjoy is height, that is you
21 mentioned that earlier.

22 Correct?

23 A. Uh-huh (yes).

24 Q. So again, let me ask, given that according to

1 your testimony and experience the substantial majority
2 of transgender women have undergone most of male
3 puberty, why is it not equally true that there is no
4 inherent reason why cisgender men's physiological
5 characteristics related to athletic performance should
6 be treated as any more of an unfair advantages than the
7 advantages that already exist among different women
8 athletes?

9 A. So if I'm following this correctly then it's ---
10 then the answer to the question why are cisgender men
11 different than transgender women?

12 Q. Why does this logic apply differently to the
13 cisgender men than to the transgender women?

14 A. So let's see. It actually doesn't. So if you
15 have a sport where that --- where the advantage or ---
16 for the --- where a known advantage for cisgender men
17 versus cisgender women was sufficiently modest, and
18 again, I wouldn't be the judge of that, but you could
19 envision that becoming a coed sport.

20 Q. Are you offering an opinion that either
21 government or leagues have an obligation to do an
22 individual by individual assessment as to whether a
23 particular natal male who experiences a female gender
24 identity does or does not enjoy a physiological

1 advantage in the sport they wish to play in as a result
2 of typical male development that they had gone through?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: Right, I'm not offering an
5 opinion. It was a long question.

6 BY ATTORNEY BROOKS:

7 Q. Would you like to hear the question back?

8 A. Sure, but I'm not offering an opinion on several
9 aspects.

10 ATTORNEY BROOKS: Would you read that
11 question back, please?

12 ---

13 (COURT REPORTER READS BACK PREVIOUS QUESTION.)

14 ---

15 BY ATTORNEY BROOKS:

16 Q. And your answer is?

17 A. So I'm not offering an opinion. I should expand
18 a bit because how that question was phrased as an
19 individual by individual person and most of these rules
20 are across a group of sports.

21 Q. And my question was about an individual person.

22 A. Your question was an individual person, but ---.

23 Q. Right. Looking at your paragraph 60, again, do
24 you believe there is --- are you offering an opinion ---

1 let me start that again. Are you able to identify for
2 me any inherent reason why a relatively weak or small or
3 slow male --- strike that.

4 You referenced in your report and also the
5 article we just looked at the IAAF regulations that
6 excluded from the female category any individual who has
7 circulating testosterone higher than five nanomolar per
8 liter. Do you recall that?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: So just to clarify, it is
11 not --- that rule for five nanomolars is not across all
12 sports.

13 BY ATTORNEY BROOKS:

14 Q. And which sports in your recollection did that
15 apply to?

16 A. Yeah, that's --- I don't remember off the top of
17 my head.

18 Q. At the very least it applied to track events.
19 Correct?

20 A. It does. But if you start to quiz me on the
21 specific distances, I won't get that.

22 Q. And nor will I so quiz you. And that
23 requirement as applied to track competition was, in
24 fact, the subject of a major international arbitration,

1 as you're aware.

2 Correct?

3 A. If we're referencing the Caster Semenya case,
4 yes.

5 Q. Did you yourself have any participation in that
6 arbitration?

7 A. I did not.

8 Q. Do you know whether Doctor Handelsman had any
9 participation in that?

10 ATTORNEY BLOCK: Objection.

11 THE WITNESS: I don't know off the top
12 off of my head.

13 BY ATTORNEY BROOKS:

14 Q. Have you ever read the arbitrarial decision in
15 that case?

16 A. I'm certain I read excerpts, but that is as much
17 as I could say.

18 Q. Okay.

19 You participated in developing on the --- a
20 member of the committee that developed the regulation
21 that you've referenced, the 7.5 nanomolar threshold?

22 A. I was on the committee that helped determine
23 that particular threshold conceptual, yes.

24 Q. And you're aware that in addition to individuals

1 such as Caster Semenya, who suffered of a disorder of
2 sexual development, that that rule would exclude some
3 transgender women from female athletics that were
4 subject to that IAAF rule.

5 Correct?

6 ATTORNEY BLOCK: Objection to the
7 terminology.

8 THE WITNESS: So I was aware that by
9 setting a threshold that there --- and even that
10 threshold in particular, that there would be transgender
11 women who would not achieve that threshold for whatever
12 reason.

13 BY ATTORNEY BROOKS:

14 Q. And did you nevertheless consider the regulation
15 to be reasonable?

16 A. If you are asking me as an expert, then again I
17 can't comment.

18 Q. Well, let me just ask you as Doctor Safer.

19 A. Am I allowed to ---?

20 ATTORNEY BLOCK: Objection to form.

21 BY ATTORNEY BROOKS:

22 Q. You are allowed.

23 A. Okay. So having a rule does make sense to me,
24 yes.

1 Q. And you thought that that rule was reasonable?

2 A. As with the data we have currently, yes,
3 personally.

4 Q. And what, in your opinion, is the inherent
5 reason that advantages conferred by testosterone levels
6 far outside the normal female range should be treated as
7 any more of an unfair advantage than the advantages that
8 already exist among different women athletes?

9 ATTORNEY BLOCK: Objection. I'm sorry.
10 Can you clarify as an expert or as an individual just
11 because you shifted back and forth?

12 BY ATTORNEY BROOKS:

13 Q. First as an expert.

14 A. So yes --- give me the question again. I'm
15 sorry.

16 Q. What, in your opinion, is the inherent reason
17 that advantages conferred by testosterone levels outside
18 the normal female range should be treated as any more of
19 an unfair advantage than the advantages that already
20 exist among different women athletes?

21 A. So to clarify we --- so, okay, let me go back.
22 Let me answer in pieces I guess or ask you to say it in
23 pieces. So what is different between typical male
24 levels of testosterone in an individual and some other

1 characteristics that are across the range of
2 characteristics of cisgender women? Is that the
3 question? Am I rephrasing that correctly?

4 Q. I'm actually referencing paragraph 60 of your
5 expert report, but my question --- and let's take for
6 instance, a natal male who has press testosterone but
7 only achieved six nanomolar per liter concentration, do
8 you have that concentration, do you have that in mind?

9 A. A transgender woman whose testosterone level is
10 six.

11 Q. Right. What in your opinion is the inherent
12 reason that advantages conferred by testosterone levels
13 above a threshold such as five nanomolars should be
14 treated as any more of an unfair advantage than the
15 advantages that already exist among different women
16 athletes?

17 ATTORNEY BLOCK: Objection to form.

18 THE WITNESS: So a couple of things.
19 First of all, I don't know that a testosterone level of
20 six is from a scientific perspective demonstratively
21 different than a testosterone level of five. It's just
22 a matter of affecting it overall. So I want to clarify
23 that. It's not that --- that that small degree is
24 necessarily relevant. And I can't even say that we

1 demonstrated advantage. It's still a theoretical with
2 regard to some of those higher testosterone levels. Let
3 me think about those for a second. Yes, so some of the
4 logic pattern for having a threshold is in order to be
5 able to limit the entire conversation to dealing with
6 transgender women or women with --- or intersex women or
7 women who for any reason have have elevated testosterone
8 levels and not to open the door at the elite level for a
9 participation by cisgender men posing as cisgender women
10 if that makes sense.

11 BY ATTORNEY BROOKS:

12 Q. Is there, in your judgment, any inherent reason
13 that advantages conferred by testosterone levels well
14 outside normal female ranges should be treated as any
15 more of an unfair advantage than the advantages that
16 already exist among different women athletes?

17 A. So I have to go back to that one. Is it my
18 opinion that male level testosterone levels ---?

19 Q. Let me --- my question is testosterone levels
20 significantly above normal female ranges?

21 A. Are --- then no, sorry. It took me a little
22 while to get there, but no.

23 Q. Because the question was complicated and the
24 answer was broken up I will ask you again, not to insult

1 you but so we have a clear record. I think I understood
2 your answer but is there, in your opinion, any reason
3 why advantages provided by testosterone level well
4 outside normal female ranges should be treated as any
5 more of an unfair advantage than the advantages that
6 already exist among different women athletes?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: And as an expert I'm not
9 rendering an opinion there, that's right.

10 BY ATTORNEY BROOKS:

11 Q. Okay.

12 In paragraph 55 of your ---.

13 ATTORNEY BLOCK: Would now be a good time
14 for a break?

15 ATTORNEY BROOKS: Let me just ask this
16 one question and then yes.

17 BY ATTORNEY BROOKS:

18 Q. In paragraph 55 you cite a 2015 article by
19 Joanna Harper?

20 A. I do, yes.

21 Q. Have you ever met Joanna Harper?

22 A. I have.

23 Q. And have you collaborated with Joanna Harper in
24 any way?

1 ATTORNEY BLOCK: Objection to the form.

2 THE WITNESS: Yeah, I don't, but I guess
3 --- it's a complicated answer, so I need to know what
4 you mean by that.

5 BY ATTORNEY BROOKS:

6 Q. I mean it broadly. Have you worked with her on
7 any sorts of projects or committees?

8 A. Well, we were both in the working group for
9 World Athletics that helped develop this threshold.

10 Q. And do you consider Doctor Harper to be
11 knowledgeable in the field of sports physiology?

12 A. I do.

13 Q. And do you consider Doctor Harper to be
14 knowledgeable with regard to the impact of testosterone
15 suppression on athletic capabilities in male?

16 A. So do I consider her to be knowledgeable in the
17 field? I certainly do. For what it's worth, she is
18 still Ms. Harper. She's actually in the Ph.D. program
19 now.

20 Q. Oh, okay. I just gave her an honorary degree.

21 A. She occupies a prominent place in the field.

22 ATTORNEY BROOKS: Let's take that break.

23 VIDEOGRAPHER: Going off the record. The
24 current time is 10:25 a.m. Eastern Standard Time.

1 OFF VIDEOTAPE

2 ---

3 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

4 ---

5 ON VIDEOTAPE

6 VIDEOGRAPHER: We are back on the record.

7 Current time reads 10:39 a.m. Eastern Standard Time.

8 BY ATTORNEY BROOKS:

9 Q. Dr. Safer, let me ask you to go back to Exhibit
10 4 Professor Handelsman's article. And if you would turn
11 in that article to page 805, the first paragraph begins
12 the strongest classification in a league sport is that
13 after puberty men 20 times more testosterone than women.

14 Do you see that language?

15 A. I do.

16 Q. And he discusses a number of results and ends
17 his paragraph by saying in concert --- quote, in concert
18 these render women on average unable to compete
19 effectively against men in power based or endurance
20 based sports.

21 Do you see that?

22 A. I do.

23 Q. And do you consider yourself qualified to
24 evaluate Professor Handelman's assertion that women are

1 on average unable to compete effectively against men in
2 power based or endurance based sports?

3 A. No.

4 Q. Not qualified?

5 A. Not qualified, correct.

6 Q. Do you believe you have an understanding ---
7 well, let me ask you this. Do you consider yourself
8 qualified to offer any opinion as to why sports have
9 been separated by sex historically?

10 A. I guess I would say I'm aware of the history.

11 Q. And in your understanding what is the reason
12 that sports have been separated by sex historically?

13 A. The history is that at a certain point where
14 sufficient development has taken place there is a
15 differential in at least some sports between men and
16 women --- between cisgender men and cisgender women such
17 that in order for women to win those events reliably
18 there needs to be a carve-out.

19 Q. And as you sit here today can you identify for
20 me any sport in which you believe that cisgender men
21 after puberty do not enjoy a significant performance
22 advantage over cisgender women?

23 A. Yes.

24 Q. Please do.

1 A. Examples include --- well, I guess I better not
2 get too far and be the expert here, but I believe
3 riflery and others in the category of hand/eye
4 coordination. I think some of the equestrian sports are
5 examples.

6 Q. Okay.

7 You are not offering any opinion, are you, that
8 the reason for separation of sports by sex is to affirm
9 sex specific social roles or identities?

10 A. I'm not aware of that. I'm not an expert on
11 those pieces, but I'm not aware personally.

12 Q. And it is not your opinion, is it, that
13 separation of sport by sex is in general unfair?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: So again, as an expert I'm
16 not commenting on fairness.

17 ATTORNEY BROOKS: I'm going to mark as
18 Safer Exhibit 5, a Decision in the arbitral award
19 delivered in the Court of Arbitration for Sport in
20 connection with the arbitration between Athletic South
21 Africa and the IAAF, a bulky document, unfortunately.

22 ---

23 (Whereupon, Exhibit 5, Court of Arbitration
24 for Sport Decision, was marked for

1 identification.)

2 ---

3 BY ATTORNEY BROOKS:

4 Q. And Doctor Safer, now that you have --- I asked
5 you earlier about whether you had seen the arbitration
6 decision and I think you said you might have read
7 excerpts of it. Looking at it today, do you believe
8 that you have ever seen a copy of the whole Decision?

9 A. I do not think I've read through the whole
10 Decision.

11 Q. Do you think you've ever held this whole
12 document in your hand before?

13 A. This is the first time that I held the whole
14 document.

15 Q. I'm going to ask you about a few quotations in
16 it, not to ask your opinions about the judgment but to
17 elicit your opinions about the science. So if you would
18 turn --- and the structure of the document is that
19 everything in it has a paragraph number which, thank
20 goodness, makes it easy to find things. So if you would
21 turn to paragraph 556. The first sentence of
22 paragraph 556 of this Decision reads there is no dispute
23 that ensuring fair competition in the female category of
24 elite competitive athletics is a legitimate objective

1 for the IAAF to pursue, closed quote. As a member of
2 the IAAF Committee that established the policy that was
3 challenged in this arbitration, do you agree or disagree
4 that there is no dispute that ensuring fair competition
5 in the female category is a legitimate objective for the
6 IAAF to pursue?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: As an expert I do not have
9 an opinion.

10 BY ATTORNEY BROOKS:

11 Q. Okay.

12 Let me ask you to turn to paragraph 456. And
13 this arbitration, as you noted, deals with the case of
14 Caster Semenya and therefore with track events, not with
15 riflery or with equestrian events. So I will ask your
16 reaction to that context. In the middle of
17 paragraph 456, beginning halfway through the sixth line
18 the panel wrote, quote, suffice to say that post puberty
19 generally speaking males outperform female athletes ---
20 I'm sorry, male athletes outperform female athletes at
21 an elite level. This difference is insurmountable,
22 closed quote.

23 Do you see that?

24 A. I do.

1 Q. And do you believe it to be true, false or
2 outside of your expertise that male athletes outperform
3 female athletes at the elite level at a difference that
4 is insurmountable?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: As a blanket statement, no,
7 I would say that is not my expertise.

8 BY ATTORNEY BROOKS:

9 Q. Let me ask you to turn to 576. I said 576. I
10 meant 577. I apologize. At the end of 577 the panel
11 has written, quote, ---.

12 ATTORNEY BROOKS: We just had static
13 here, so let me ask whether people outside the
14 conference room are hearing us? If somebody could
15 unmute.

16 ATTORNEY TRYON: I can hear you.

17 ATTORNEY BROOKS: We just had some static
18 that caused me concern.

19 BY ATTORNEY BROOKS:

20 Q. At the end of paragraph 577 the panel wrote,
21 quote, male athletes do not have to be elite to surpass
22 even the very best female athletes. Dr. Berman pointed
23 out that in a race such as the 800 meter, a 1.6 percent
24 advantage, as calculated in BG17, was sufficient to

1 determine first place by the region of nine meters,
2 closed quote.

3 Do you see that language?

4 A. Yes.

5 Q. And do you consider it to be true, false or
6 outside your expertise that male athletes do not even
7 have to be elite to surpass the very best female
8 athletes?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: In a --- as a blanket
11 statement it is outside my expertise.

12 BY ATTORNEY BROOKS:

13 Q. And do you have an opinion as to whether a
14 1.6 percent advantage is a significant advantage or
15 insignificant advantage?

16 A. I think that's too complicated as phrased for me
17 to answer.

18 Q. That's actually one of the simpler questions
19 that I've asked today. Let me ask it again and ask you
20 to think. Do you have an opinion, and if you --- one
21 answer of course is I don't have an opinion or it is
22 outside of my expertise, but do you have an opinion as
23 to whether a 1.6 percent advantage in a track event is a
24 significant advantage?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: So it depends on the event.

3 BY ATTORNEY BROOKS:

4 Q. Why does it depend on the event?

5 A. Well, there are events where we see --- as an
6 elite Olympic event where the runners are virtually
7 tied. And 1.6 percent then will be significant in the
8 moment because that will be described in that field.
9 And yet there are other events where people are far more
10 spread out and there's greater --- in every element,
11 then 1.6 percent advantage becomes lost in that noise.

12 Q. And --- well, let's take competitive high school
13 athletics, competitive high school track. Do you have
14 an opinion as to 1.6 percent advantage in that context
15 is significant or insignificant?

16 A. I do not have an opinion.

17 Q. So if I understand correctly, your point in some
18 context you know that 1.6 percent is significant but
19 that in other context you don't know one way or the
20 other?

21 ATTORNEY BLOCK: Objection to the form.

22 THE WITNESS: Yes, I guess I would say
23 that in some context I can see that 1.6 percent is
24 significant and then in other context I can see that 1.6

1 percent does not appear to be significant. And actually
2 even if you're asking as an expert, what even is
3 significant is outside my purview, but with that
4 understood I can still see that someone would say it one
5 way and not say it the other way.

6 BY ATTORNEY BROOKS:

7 Q. Let me ask you to turn to paragraph 357. And
8 first I will ask you to turn to page 88, paragraph 351,
9 just so you can see we're in a section summarizing the
10 testimony of Professor David Handelsman. That begins at
11 paragraph 351. And then I'm going to call your
12 attention to paragraph 357 and it puts you to the
13 statement there.

14 357 includes a number of bullet points. The
15 third bullet point, which is on page 91, reads --- and
16 again this is --- the paragraph begins, quote, Professor
17 Handelsman went on to explain in greater detail why the
18 sex difference in circulating testosterone is the cause
19 of the difference in athletic performance between men
20 and women, and then there are bullet points. The third
21 bullet point reads, on average, women have 50 to
22 60 percent of men's upper arm muscle cross-sectional
23 area, 65 to 70 percent of men's thigh muscle
24 cross-sectional area, 50 to 60 percent of men's limb

1 strength and 60 to 80 of men's leg strength. Do you see
2 that language?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: I do.

5 BY ATTORNEY BROOKS:

6 Q. Do you have any knowledge as to whether those
7 statistics are on correct as given by Dr. Handelsman?

8 A. I do not.

9 Q. And do you have any expert knowledge as to how
10 those statistics do or do not change under the influence
11 of testosterone suppression in natal males who
12 experience a female gender identity?

13 ATTORNEY BLOCK: Objection to
14 terminology.

15 THE WITNESS: So I guess the --- I have
16 no expert knowledge about these numbers, per se, but I
17 do know as an expert that when testosterone levels are
18 suppressed in transgender women and actually in
19 cisgender men, anyone, that these numbers are decreased.
20 And I can say that with confidence as an expert.

21 BY ATTORNEY BROOKS:

22 Q. But you're not able to quantify that decrease.
23 Is that correct?

24 A. I cannot quantify that decrease. The data gets

1 murky when we start to get there.

2 Q. Have you ever met Professor Coleman at Duke
3 University?

4 A. Doriane Coleman?

5 Q. Yes.

6 A. I have.

7 Q. And in what context have you interacted with
8 Professor Coleman?

9 A. The --- a professional context.

10 Q. Can you describe the context?

11 A. We have served on some of these --- two of the
12 same committees --- committee task force, whatever you
13 call it, for World Athletics together.

14 Q. Was she, in fact, on the committee which you
15 participated that set the five nanomolar standard for
16 the IAAF?

17 A. I don't recall for sure but I think not.

18 Q. Then can you identify for me the two committees
19 that you recall that you did sit on with Professor
20 Coleman?

21 A. Subsequent to the initial group, and I don't
22 know that it's two committees, it may be the same
23 committee, they get renamed. Things like that happen.
24 So it is --- I'm thinking forward to assisting other

1 international federations with their rule making.

2 Q. And do you consider Professor Coleman to be
3 knowledgeable about the relative athletic capabilities
4 and records of male and female athletes?

5 A. To me that's too vague a question. She's a
6 lawyer.

7 Q. Are you aware also of her athletic background as
8 a competitive athlete?

9 A. I am.

10 Q. And are you aware of her research and
11 publications having to do with athletic records and
12 capabilities of male and female athletes?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: I'm aware of some of her
15 publications where she has co-authored, but she's not
16 usually the physiology expert in the group.

17 BY ATTORNEY BROOKS:

18 Q. Let me ask you to turn to paragraph 393. And if
19 you look at the page you will see that this is within
20 the tribunal summary of testimony of Professor Coleman.
21 Let me ask you since you dealt personally with the
22 professor, because I want the record to be respectful,
23 does she in general use --- prefer to be referred to as
24 Professor Lambelet-Coleman or simply Professor Coleman?

1 A. I don't know the answer.

2 Q. Okay.

3 A. I prefer to her on a first name basis.

4 Q. All right.

5 I will stick with the shorter version. In
6 paragraph 393 the panel describing Professor Coleman's
7 submission states, quote, Professor Lambelet-Coleman's
8 report compared the lifetime best performance of three
9 elite female athletes in the 400-meter event with the
10 performance of male athletes in the same event during a
11 single year, 2017, period. This showed not only that
12 the elite females would have lost to the best men by a
13 margin of about 12 percent but also that even at their
14 absolute best the elite females would have lost to
15 thousands of other boys and men by a much smaller
16 margin, closed quote. Do you see that language?

17 A. I do.

18 Q. And do you have any reason to doubt the accuracy
19 of that summary of athletic performance statistics?

20 A. I can't render an expert opinion there.

21 Q. Do you as you sit here today have any reason to
22 doubt the accuracy of those statistics?

23 A. Again, I cannot comment as an expert. I guess
24 that's the bottom line.

1 Q. If it is true that the most elite female
2 athletes performing at their absolute best would lose to
3 thousands of others boys and men. It is also true,
4 would you not agree, that the very best female college
5 athletes would lose to even a larger number of
6 collegiate boys and men?

7 A. If I'm speaking as an expert, then I'm not
8 rendering an opinion there.

9 Q. How about as a highly educated and intelligent
10 professor?

11 A. Simply in that context, it would be true that
12 --- that it would least be true at some level in the
13 elite levels of college.

14 Q. And the very best female high school athletes
15 would lose to an even larger number of high school boys.

16 Correct?

17 A. So now I can render a little bit of an expert
18 comment, which is that as you move down that line, the
19 degree of difference falls because the degree of
20 testosterone impact on body is evolving across those
21 ages.

22 Q. If it's true that the world fastest female
23 athletes would lose to thousands of boys and men then it
24 is inevitably true, is it not, Doctor Safer, to say that

1 the very best female high school athletes would lose to
2 even larger numbers of high school boys?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: So the --- it is the coils
5 here. So it would be larger numbers of cisgender men in
6 general, including people who are older than they are,
7 but I'm not sure where that would be going.

8 BY ATTORNEY BROOKS:

9 Q. Let me take you back to your expert report,
10 Exhibit 1, and take you to paragraph 48. Actually, let
11 me have the Declaration, which is Tab 50.

12 ATTORNEY BROOKS: Let me mark as Safer
13 Exhibit 6 a Declaration of Dr. Safer executed in
14 May 10th, 2021.

15 ---

16 (Whereupon, Exhibit 6, 5/10/21 Declaration
17 of Dr. Safer, was marked for
18 identification.)

19 ---

20 BY ATTORNEY BROOKS:

21 Q. And I apologize, it's paragraph 50. Dr. Safer,
22 did you, in fact, prepare and execute this Declaration
23 in the time leading up to May 26, 2021?

24 A. Yes.

1 Q. And you state in paragraph 48 that, quote, age,
2 grade competitive sports records show minimal or no
3 difference in athletic performance between
4 non-transgender boys and non-transgender girls before
5 puberty, and you cite Handelsman, the article that we
6 have been looking at.

7 Correct?

8 A. Yes.

9 Q. And what research did you do to arrive at the
10 conclusion that age grade competitive sports records
11 show minimal or no difference in athletic performance
12 between non-transgender boys and non-transgender girls?

13 A. Is the question of original research on my part?

14 Q. No, what steps did you take to arrive at that
15 conclusion?

16 A. Reading relevant literature.

17 Q. You cited only Professor Handelman's 2018
18 article. Did you read other literature that gave you
19 comfort that is a true statement?

20 A. I have read other literature, but I would
21 suggest that Doctor Handelsman gave --- Doctor
22 Handelsman's paper is the best summary of the point.

23 Q. And again, in making this statement, what did
24 you consider to be a minimal difference?

1 A. When I'm thinking about this as a scientist it
2 is a difference where I'm not sure if it is true or
3 whether it is significant when defining the word
4 minimum.

5 Q. You just defined minimal by using the work
6 significant. You force me to ask you what do you mean
7 by significant?

8 A. Sorry. So as a scientist --- well, there are
9 two definitions of significant. So the one is that it
10 is relevant for those --- for decision makers. And that
11 actually gets outside of my expertise. And then we do
12 use it as a term of art in science as well.

13 Q. You meant statistically significant?

14 A. The second would be statistically significant,
15 that's right.

16 Q. Dr. Safer, you deleted that sentence from your
17 expert report.

18 Is that correct?

19 A. I have to look.

20 Q. I don't mean it to be a trick question. Let me
21 ask you this. Do you recall removing that sentence as
22 you revised your Declaration to create your expert
23 report?

24 A. No.

1 Q. All right.

2 A. I don't recall.

3 Q. We will just move on to the science and not ask
4 you deleted the question. Let me take you to paragraph
5 44 of your expert report, Exhibit 1. And just to be
6 sure, you are on the expert report now and not the
7 Declaration? They are so similar that it is easy to get
8 confused.

9 A. Yes.

10 Q. Paragraph 44 you say in the second sentence,
11 increased testosterone begins to affect athletic
12 performance at the beginning of puberty, but those
13 effects continue to increase each year of puberty until
14 about 18, with the full impact of puberty resulting from
15 the cumulative effect of each year. Do you see that
16 language?

17 A. I do.

18 Q. And just to clarify, in making this statement
19 what do you refer to as, quote, the beginning of
20 puberty? And we're talking about male typical puberty
21 in this discussion so as to clarify. So what do you
22 have in mind as the beginning of male puberty?

23 A. So the answer is complex. The typical male
24 puberty is defined as beginning with what we label as

1 Tanner 2. And in terms of when you would see impact on
2 athletic performance, per se, is not well established.

3 Q. And now stretching that in both directions, on
4 the one hand Tanner Stage 2, if I'm correct, is
5 essentially defined as certain first observable physical
6 changes in a boy's body.

7 Right?

8 A. Tanner 2 is specifically defined as specific
9 observable changes in a person's body, yes.

10 Q. And therefore, testosterone levels have begun to
11 increase even before the first observable changes that
12 result.

13 Correct?

14 A. The way it's understood in medicine is it is
15 reflective of existing reality. So it is not
16 necessarily --- you know, only in the absolute.

17 Q. Well, as a medical doctor, you would agree with
18 me or would you not that testosterone levels must
19 increase in the body before observable changes in the
20 body caused by testosterone can be --- can come about?

21 ATTORNEY BLOCK: Objection to the form.

22 THE WITNESS: So it must be the case that
23 the testosterone levels would have to rise prior to
24 their having a noticeable effect, that is true.

1 BY ATTORNEY BROOKS:

2 Q. Cause has to precede effect?

3 A. Cause in this case has to precede effect,
4 exactly. But I caution that it is not clear that that's
5 something that we could parse out medically in a given
6 person in a reasonable way. That is I don't know that I
7 could do a blood test and catch it as it were.

8 Q. Okay.

9 Can you explain to me what you were referring
10 to when you mentioned the cumulative effect of pubertal
11 changes at the end of that sentence?

12 A. Where are we now?

13 Q. We are in the second sentence of paragraph 44 of
14 Exhibit-1. And you say at the end with a full impact of
15 puberty resulting from the cumulative effect of each
16 year, and if you would explain for the Court what you
17 meant by cumulative effect that would be helpful.

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: So the testosterone has
20 impact on certain tissues, and then it continues to have
21 impact on tissues. And I don't know that I have any
22 greater explanation for the right cumulative impact.

23 BY ATTORNEY BROOKS:

24 Q. So your point is that by the age of 18 whatever

1 advantages in athletic performance a particular male has
2 is due to body changes that have happened each year
3 since puberty began, not due simply to the testosterone
4 level of that individual at age 18?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: The meaning isn't as --- I
7 guess I would be careful about overstating it, so there
8 can --- there might be some impact earlier and then
9 there might be additional impact over time, but --- and
10 so in the absolute it would be true to say that all of
11 the effect doesn't occur at Tanner 5, which is the
12 defined end.

13 BY ATTORNEY BROOKS:

14 Q. Okay.

15 The cumulative physiological changes that you
16 are referring to here result from a multi-year history
17 of male typical levels of testosterone by age 18.

18 Correct?

19 A. Yes. Well, even that is --- there's complexity
20 but yes.

21 Q. You say --- sorry, we are jumping back and
22 forth.

23 A. Actually, just continuing a little bit further,
24 it's also about age 18 is not a trivial word.

1 Q. Understood. And I simply used that as a
2 representative end marker and for some individuals it
3 would be earlier and for some individuals it would be
4 later.

5 Correct?

6 A. That's right, even with the college athletes.

7 Q. You state at the beginning of paragraph 44 that,
8 quote, the concerns that animated the World Athletics
9 and prior IOC policies are even more attenuated for
10 students in the middle of high school where athletes
11 typically range from 11 to 18.

12 Do you see that?

13 A. I do. Was this paragraph 44?

14 Q. It is. And by attenuated you mean the same in
15 nature but smaller in scale.

16 Correct?

17 ATTORNEY BLOCK: Objection to form.

18 THE WITNESS: Yeah, I can't even say that
19 so --- yeah, I can't ---.

20 BY ATTORNEY BROOKS:

21 Q. Isn't that what attenuated means?

22 ATTORNEY BLOCK: Objection to form.

23 THE WITNESS: Attenuated is both in scale
24 and type in this case.

1 BY ATTORNEY BROOKS:

2 Q. All right.

3 You are not here or anywhere denying that the
4 same type of concern, that is physiological advantages,
5 exist at for instance age 15?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: So sorry, say that again.

8 BY ATTORNEY BROOKS:

9 Q. You are not in this paragraph or anywhere
10 offering an opinion that the same type of concerns, that
11 is physiologic or in performance advantages, exist to
12 some degree at, for instance, age 15?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: I'm not offering an opinion
15 there, that's right.

16 BY ATTORNEY BROOKS:

17 Q. And the same is true at age 13?

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: I'm not --- so I guess as
20 we --- as you move along to the continuum, then ---.

21 BY ATTORNEY BROOKS:

22 Q. It gets more attenuated?

23 A. The opinion --- right, the opinion shifts
24 because it depends on context.

1 Q. In paragraph 49 of your expert report you write
2 in the third full sentence, quote, West Virginia
3 categorically prevents girls who are transgender from
4 participating on girls teams regardless of whether they
5 are prepubertal, receiving puberty blockers, or
6 receiving gender-affirming hormone therapy, closed
7 quoted. Do you see that?

8 A. I do.

9 Q. What in your opinion is the significance of that
10 statement? What is your point?

11 ATTORNEY BLOCK: Objection. Could you
12 just give him some time to read the context?

13 BY ATTORNEY BROOKS:

14 Q. Yes.

15 A. So I guess I maybe make the --- help me with
16 where you're going with that question. I'm --- the rule
17 as written includes all transgender girls.

18 Q. Are you --- did you mean to suggest that medical
19 science would dictate that the West Virginia law should
20 make an exception for natal males who have
21 suppressed puberty?

22 ATTORNEY BLOCK: Object to form.

23 THE WITNESS: The context for the --- the
24 context of different transgender girls with different

1 degrees of treatment and different stages of puberty are
2 different. I guess that's as much I would say. I'm not
3 expressing an opinion about what the --- I'm serving
4 here just as a scientist in terms of what the --- what
5 the --- what we know about athleticism.

6 BY ATTORNEY BROOKS:

7 Q. You are not offering an opinion that either
8 science or reasonableness requires that West Virginia's
9 laws make an exception for natal males who have
10 suppressed puberty?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: I'm not offering an opinion
13 that that would be --- that would be a logical law for
14 transgender girls in that circumstance.

15 BY ATTORNEY BROOKS:

16 Q. And in the article that we began today looking
17 at you expressed concern about policies that would
18 create incentives for children to begin puberty
19 blockers, would you not?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So earlier in my --- I
22 reference that as a concern. I want to be clear that as
23 an expert I'm not suggesting that --- I'm not suggesting
24 an expert opinion that these needs to be concerns. I'm

1 raising the issues that we are considering.

2 BY ATTORNEY BROOKS:

3 Q. Well, what you wrote to educate your colleagues
4 as an endocrinologist, you, Professor Safer, raise that
5 as a concern?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: To be clear, I raised it as
8 a concern of the community. I did not take an opinion
9 in that article that it was a concern that I was
10 offering as an expert.

11 BY ATTORNEY BROOKS:

12 Q. Well, let me ask you as a medical doctor sitting
13 here today, an endocrinologist, it would cause you
14 concern, would it not, that policies are adopted that
15 created incentives for children to start puberty
16 blockers when they might otherwise not choose to do so?

17 ATTORNEY BLOCK: Objection to form and to
18 scope.

19 THE WITNESS: It's too broad of a
20 question as you're asking it because there is certainly
21 --- in medicine it is certainly the case that we fear
22 coercing people to certain treatments and certain
23 circumstances but they are certainly alternate examples
24 where we very much coerce people to have certain medical

1 interventions. And so as an expert I have no opinion,
2 as we said already. And simply as somebody trying to be
3 logical and thoughtful I can come up with examples in
4 both certain circumstances.

5 BY ATTORNEY BROOKS:

6 Q. I'm going to ask you to take Exhibit-6 --- no,
7 Exhibit 4, the Handelsman article if you would.

8 A. Yes.

9 ATTORNEY TRYON: Roger, would you speak
10 up a little more, please? And Josh, when you shuffle
11 your papers, it really garbles the testimony. If you'd
12 be a little more careful about that, I'd appreciate it.

13 ATTORNEY BLOCK: Sorry.

14 ATTORNEY BROOKS: It's a crowded table
15 and we have papers bumping up against the mic. So just
16 call out if we do that wrong.

17 BY ATTORNEY BROOKS:

18 Q. So Dr. Safer, you pointed to the Handelsman
19 article as the best source on the proposition --- on the
20 question to what extent if any natal male has
21 physiological or I should say athletic performance
22 advantages over natal females before puberty.

23 Correct?

24 ATTORNEY BLOCK: Objection to

1 terminology?

2 THE WITNESS: And if I said the word best
3 maybe that's not the best way of saying it, but it's a
4 very clean, well-written summary of the circumstance.

5 BY ATTORNEY BROOKS:

6 Q. At any rate, it's the one that you chose to
7 cite?

8 A. And it is the one that I chose to cite.

9 Q. I'm going to give you a three by five card to
10 help read a chart that doesn't have grid lines on it so
11 you have a straight edge. And I want to take you in
12 Handelsman's 2018 article, Exhibit 4, to page 813 and
13 figure one. And you've familiar with this figure and
14 these curves, are you not?

15 A. I am, yes.

16 Q. When you studied this article carefully this is
17 part of what you studied.

18 Right?

19 A. It is.

20 Q. And these charts show percentage performance
21 advantage of males over females and just to simplify
22 terminology I believe there's nothing in here about
23 dealing with transgender individuals in these charts.
24 So with your permission I'll simply use male and female

1 to be the dare I say simple biological designations as
2 we had previous discussions. Is that acceptable?

3 A. I think so.

4 Q. If it's something that comes up ---.

5 A. I will mention it, yes.

6 Q. I don't think it will in this discussion. First
7 of all, would you agree with me that, generally
8 speaking, junior high contemplates grades 7 through 9
9 and commonly ages in the range of 12 to 15?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: Junior high is grades 7
12 through 9. It used to be. Now there is Middle School.

13 BY ATTORNEY BROOKS:

14 Q. I know?

15 A. Exactly.

16 Q. Let's just work with you and I are of general
17 age. So Junior High is 7 to 9?

18 A. Okay.

19 Q. And in your general understanding, this is
20 layman's stuff, not expert stuff, that is ages 12 to
21 15-ish?

22 A. Let's see, seven --- let me think about this.
23 Right, 15 at about the max, right, because there is
24 about 14.

1 Q. And high school is 14, 15 through age 18-ish.
2 Some people graduate at age 17?

3 A. Yes. As a non-expert I would believe, yes.

4 Q. All right.

5 And this chart charts the percentage advantage
6 enjoyed --- on average enjoyed by males over females in
7 three different events at over --- on a year by year
8 basis from ages 10 up to 19.

9 Am I describing it correctly?

10 ATTORNEY BLOCK: Objection to form. Just
11 for the record, it's percentage differences, not
12 percentage advantages.

13 BY ATTORNEY BROOKS:

14 Q. Correct, it says --- it says gender difference
15 percentage to read the Y axis.

16 A. Clear, yes.

17 Q. Okay.

18 So let's look at running and you have your
19 straight edge if it is helpful to you. At age 12, what,
20 according to Dr. Handelsman, is the gender difference in
21 running performance?

22 A. So in this paper there is a range. But just to
23 help you get to your point faster I guess we can --- it
24 is about five percent of tab over.

1 Q. And for reasons best known to Professor
2 Handelsman, his arrow bars extend only upwards, correct,
3 in this chart?

4 A. Right. I will have to attribute that to
5 cleanliness of the figure.

6 Q. Or if he has chosen to fit his curve to the
7 bottom end of this error range possibly?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: Yeah, I can't comment
10 there, but that wouldn't be usual.

11 BY ATTORNEY BROOKS:

12 Q. That would not be usual, I agree. And what
13 advantage --- what gender difference between male and
14 female does Professor Handelsman report at age ten
15 approximately?

16 A. At age ten in the particular figure that we are
17 referencing it is --- the average is --- well, actually,
18 so here it ranges from about two percent because that is
19 probably how the air bars are meant to be up to just a
20 little north to three percent.

21 Q. And going back to age 12, do you consider a five
22 percent difference between male and female performance
23 to be minimal?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So the problem here with
2 going right to this figure is it's including a range of
3 inputs, and so this is --- so these are what are called
4 cross-sectional studies, and so the --- if your question
5 is just in the narrow point of this five percent
6 minimal, well, even there I don't know that I can
7 comment because it depends on how broad the variation is
8 among the group.

9 BY ATTORNEY BROOKS:

10 Q. And what gender difference did Dr. Handelsman
11 report in running at age 15?

12 A. At age 15, a range that is hovering about 9 to
13 10 percent.

14 Q. And by age 15, according to his sample, the
15 gender difference is approached --- begins to level off.
16 In other words, it has --- most of the gender difference
17 has been achieved at age 15.

18 Correct?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: Among this data in this
21 study set, yes, I will agree with you it does level off.

22 BY ATTORNEY BROOKS:

23 Q. So let me ask you this. Do you have an
24 understanding of the physiological basis of what you

1 described as a two to three percent male advantage at
2 age ten in running?

3 ATTORNEY BLOCK: Objection to form.

4 BY ATTORNEY BROOKS:

5 Q. If any?

6 A. So speaking as an expert, there's no --- there
7 is no physiological --- there is no expectation of a
8 physiological explanation. And there is awareness of
9 other confounders in terms of experience, exposure to
10 sport and things like that.

11 Q. Let me ask you to look at jumping, at age ten.
12 And this is --- at age ten what performance of gender
13 difference advantage did Dr. Handelsman report for boys
14 in jumping?

15 A. So at age ten it would go on --- so at age ten
16 then the range ---.

17 Q. This by the way tells us that he cannot be
18 inclined in arrow bar --- a symmetrical arrow bar below.

19 Correct?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So he can't. In fact, the
22 range that he's showing there goes from an advantage for
23 girls --- that is it goes below to an advantage --- for
24 boys. The range is included and it just --- for both

1 sexes.

2 BY ATTORNEY BROOKS:

3 Q. So what is the average advantage that he reports
4 at age ten for boys?

5 A. So in this dataset the average is about a six
6 percent average for boys, but it is important to
7 understand the data. And the data that --- the point
8 being that if we were to repeat the study you would
9 anticipate that that average would fall across those
10 entire --- the entire range shown so that in a different
11 day it might show a bigger advantage for boys, but a
12 different day it might also show an advantage for girls
13 about higher.

14 Q. Are you aware of any dataset that shows a
15 smaller advantage in jumping for girls at age ten?

16 A. Off the top of my head I cannot guide --- lead
17 you to a dataset.

18 Q. At age 12 what advantage in jumping --- well,
19 let me start over. At age 12 what advantage in jumping
20 does Dr. Handelsman report for boys?

21 A. So in this dataset at age 12 he shows the
22 advantage --- the average advantage to be of the less
23 than the average advantage for age ten, but this exactly
24 points to the caution that I was referencing, which is

1 that the range of possibilities that you might
2 anticipate based on this particular dataset at age 12
3 has a range of four to six percent advantage for boys.

4 Q. The arrow bar has tightened up a lot?

5 A. The arrow bar in that age range is tighter.

6 Q. And do you consider a six percent advantage to
7 be minimal?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: As an expert I can't answer
10 that because it depends on context on the heterogeneity
11 of all these events.

12 BY ATTORNEY BROOKS:

13 Q. And at age 15 what average advantage in jumping
14 did Dr. Handelsman report for boys?

15 A. For age 15 he has a range or the average sits at
16 15 percent and the range runs from about 14 percent to
17 maybe 17 percent.

18 Q. Is there any context in your opinion, any
19 athletic endeavor that involves jumping in which a 15
20 percent advantage is in your view minimal?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: Yes, I think as an expert I
23 can't answer that. If you're thinking at the scholastic
24 level where there is a wide range of --- where there's a

1 quite wide range of heterogeneity in development, body
2 type, et cetera, I certainly could envision a situation,
3 yes.

4 BY ATTORNEY BROOKS:

5 Q. Dr. Safer, in your Declaration filed in May you
6 stated that before puberty athletic advantage by boys
7 was minimal. Do you recall that language?

8 A. The way I would say it is the difference between
9 boys and girls before puberty is minimal or
10 non-existent. I don't know if I could be wiser than
11 that.

12 Q. All right. But now you are telling me when I
13 asked you questions about minimal that you as an expert
14 are not able to define minimal. How do you reconcile
15 those two?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: So the definition of
18 minimal is in context. And so as we discussed it was
19 not a significant difference using both those
20 definitions that we already used were no different at
21 all.

22 BY ATTORNEY BROOKS:

23 Q. Your statement in your Declaration simply
24 asserted categorically in almost no context that the

1 difference in athletic capability of boys to girls were
2 both minimal. My question for you is using whatever
3 definition you had in mind when you wrote that do you
4 consider a --- I will look at jumping, a five percent
5 difference in capability to be minimum?

6 ATTORNEY BLOCK: Objection to form and
7 characterization of the report.

8 THE WITNESS: So it's a context. So in
9 the report the reference is to prepubertal children.
10 And there it is easier to be more categorical. Where
11 now we're moving into an area where there is --- where
12 things are more complex and so it is a harder context to
13 make that statement.

14 BY ATTORNEY BROOKS:

15 Q. That is a sample of ten-year old boys includes
16 some who are no longer prepubertal.

17 Correct?

18 A. No. I'm saying it more the other way, which is
19 a sample of ten-year-old boys would overwhelmingly be
20 prepubertal but a sample of 15-year-old boys would have
21 more of a range and have more heterogeneity. And
22 there's more to it even than that, which is the
23 definition of minimal also includes the context of the
24 entire population who participated in the sport.

1 Q. So focusing on ten-year-old boys and jumping you
2 said at age ten the large majority of boys are,
3 according to your definition, prepubertal. Referring
4 back to Declaration and the meaning that you ascribed to
5 the word minimal there, in your view, is a six-percent
6 difference in capability minimal or not minimal?

7 ATTORNEY BLOCK: Objection to form and to
8 talking about his Declaration without it being in front
9 of him.

10 ATTORNEY BROOKS: He has it in front of
11 him and we already looked at the language.

12 BY ATTORNEY BROOKS:

13 Q. You may answer.

14 A. So the graph that we are looking at includes
15 arrow bars that include the possibility that boys would
16 have --- that the girls would have a superior outcome,
17 and so the answer then becomes, yes. Where the data are
18 either small or are suspect or not significant, then all
19 of that collectively certainly is --- would be included
20 as minimal to non-existent.

21 ATTORNEY BROOKS: Let me mark as Exhibit
22 Safer 7 a paper by Emma Colton and Tommy Lundsburg
23 entitled Transgender Women in a Female Category of
24 Sport, from 2021, previously marked as Exhibit 13 at Dr.

1 Adkins's deposition.

2 ---

3 (Whereupon, Exhibit 7, Transgender Women In
4 a Female Category of Sport, was marked for
5 identification.)

6 ---

7 BY ATTORNEY BROOKS:

8 Q. And first, Professor Safer, let me ask whether
9 you're familiar with this paper published last year?

10 A. I am familiar.

11 Q. And have you interacted professionally with
12 either Dr. Colton or --- and I don't know his degree,
13 Mr. Lundsburg in any context?

14 A. Here I don't remember.

15 Q. Okay.

16 Do you believe that you became aware of this
17 paper soon after it was published?

18 A. I don't know if I can answer that cleanly
19 either, but I certainly have become aware of it
20 somewhere between then and now.

21 Q. And have you read it with some care?

22 A. I have read it with some care, yes.

23 Q. Let me ask you --- well, let me ask you this
24 first. Would you describe this paper as reporting

1 original research or as more of a literature review
2 paper?

3 A. I don't recall them reporting on their original
4 research, but I would have to look. It's mostly a
5 review paper.

6 Q. That is also my impression. I just didn't want
7 to create a different impression. Let me ask you to
8 turn to page 201, and there in the first column
9 beginning six lines down there is a sentence that begins
10 an extensive review. Let me ask you to find that.

11 A. I have it.

12 Q. And that --- I'll read it into the record.
13 Quote, an extensive review of fitness data from over
14 85,000 Australian children age 9 to 17 years old showed
15 that compared with nine-year-old females, nine-year-old
16 males were faster over short sprints, 9.8 percent, and
17 one mile, 16.6 percent, could jump 9.5 percent farther
18 from a standing start, which tested explosive power,
19 could complete 33 more push-ups in 30 seconds and have
20 13.8 percent stronger grip. Male advantage of a similar
21 magnitude was detected in a group study of children
22 where compared to a six-year old females six-year old
23 males competed 16.6 percent more shuttle runs in a given
24 time and could jump 9.7 percent further from a standing

1 position. Do you see that language?

2 A. I do.

3 Q. And on the Australian study, if you follow the
4 footnote you will see that it references a study by
5 Kaitlin Thompson. That's footnote 22. And my first
6 question is have you read the reference study by Kaitlin
7 Thompson?

8 A. I don't recall. I'm guessing yes.

9 Q. All right. All right.

10 Do you have any reason to doubt the accuracy of
11 this summary of the findings of Kaitlin Thompson
12 based on data from over 85,000 Australian children?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: I think the important thing
15 to recognize when you look at these sorts of data are
16 recognizing the multiple inputs. So the larger these
17 groups --- these cross-sectional studies get the more
18 confounded they get by access and other social
19 explanations why there are boys participating in sports
20 to a greater degree.

21 BY ATTORNEY BROOKS:

22 Q. So putting aside causation, which might be
23 physiological and might be cultural, as you said there
24 could be various causes, do you have any reason to doubt

1 the accuracy of the findings of performance advantage
2 summarized here in the passage that I've just read?

3 ATTORNEY BLOCK: Objection to form and
4 terminology.

5 THE WITNESS: Putting aside causation, I
6 have no --- I can't offer an expert opinion I guess if
7 that's the bottom line. But if you're asking me just as
8 an individual, I'm not expecting that they're
9 fabricating that data. I am not expecting that.

10 BY ATTORNEY BROOKS:

11 Q. And you agree that advantages on a scale of 9
12 percent, 16 percent could provide a significant
13 advantage in athletic competition, do you not?

14 ATTORNEY BLOCK: Objection to
15 terminology.

16 THE WITNESS: So say that question again.

17 BY ATTORNEY BROOKS:

18 Q. You agree that advantages on the scale of
19 9.8 percent or 16.6 percent would provide a large
20 advantage in athletic competition, do you not?

21 ATTORNEY BLOCK: Same objection to
22 terminology.

23 THE WITNESS: In elite athletic
24 competition, yes.

1 BY ATTORNEY BROOKS:

2 Q. Did you play any sport in high school?

3 A. At a sophisticated level I did not.

4 Q. Your general knowledge permits you to say, does
5 it not, that at the high school level also a 9.8 percent
6 or a 16.6 percent advantage is a very large advantage?

7 ATTORNEY BLOCK: Objection to form and
8 terminology?

9 THE WITNESS: So there it gets more
10 diffuse, therefore, and I can't answer as an expert.

11 BY ATTORNEY BROOKS:

12 Q. Can you answer as an informed adult citizen?

13 ATTORNEY BLOCK: Same objection.

14 THE WITNESS: So as an expert for sure
15 not. As an informed adult, it falls back to the same
16 situation. When there is a wide range of athletes in a
17 certain context, then it is going to seem less relevant.
18 And obviously with the example I gave before with an
19 elite circumstance where that --- it describes the
20 entire field is more significant.

21 BY ATTORNEY BROOKS:

22 Q. Let me ask you to find your rebuttal report.

23 A. And actually --- do others need a break?

24 Q. Any time --- your concentration is most

1 important. So if you need a break, we'll take a break.

2 A. So I'm good.

3 ATTORNEY BROOKS: Well, obviously, if
4 anybody wants a break, we can take a break.

5 ATTORNEY BLOCK: Do you need a break?

6 ATTORNEY SWAMINATHAN: No.

7 ATTORNEY BLOCK: We are good.

8 THE WITNESS: So my rebuttal.

9 BY ATTORNEY BROOKS:

10 Q. Your rebuttal, which is Exhibit 2, so it's
11 probably at the bottom. And in that I'm going to draw
12 your attention to paragraph 11. And there you wrote
13 there is also no basis to confidently predict the
14 patterns about the athletic performance of prepubertal
15 cisgender boys will be the same for prepubertal
16 transgender girls, closed quote. Do you see that?

17 A. I do.

18 Q. And let me attempt to see if I understand the
19 point of this paragraph. And indeed, if you would like
20 to read the whole paragraph you should. But my
21 understanding of the point is that you're saying that
22 even if prepubertal boys have some performance, some
23 statistically significant performance advantage over
24 prepubertal girls, that you are not confident that the

1 athletic performance capabilities of natal males who
2 identify as females before puberty will be the same as
3 those of natal males who identified as male before
4 puberty?

5 ATTORNEY BLOCK: Objection to the
6 terminology.

7 THE WITNESS: So to the extent --- so
8 were differences to be determined between cisgender boys
9 and cisgender girls, it is correct to say that that
10 won't conclusively demonstrate that the same applies for
11 transgender girls. That's right.

12 BY ATTORNEY BROOKS:

13 Q. Now, elsewhere in your writings you have said
14 that it is well known that the majority of prepubertal
15 children who experience gender dysphoria do not persist
16 in that dysphoria into pubertal adolescence.

17 Correct?

18 ATTORNEY BLOCK: Objection.

19 THE WITNESS: No.

20 BY ATTORNEY BROOKS:

21 Q. Not correct?

22 A. Not correct.

23 Q. Then we will come back to that. In this
24 paragraph 11, you speculate a little farther down that,

1 quote, the experience of transgender girls might be more
2 similar to the experience of cisgender girls?

3 ATTORNEY BLOCK: Objection to the
4 characterization and speculative.

5 BY ATTORNEY BROOKS:

6 Q. Well, by using the word might you meant to
7 indicate, did you not, Dr. Safer, this is a hypothesis,
8 this is not a documented fact?

9 A. That if the question is do I know that the
10 experience of transgender girls is definitely in this
11 circumstance the same as cisgender girls, that's right,
12 I don't know that. It only might be true.

13 Q. And towards the end, in the last line, you refer
14 to potential biological underpinnings of gender
15 identity. Again, the word potential signaling that no
16 such specific underpinnings have yet been identified.

17 Correct?

18 A. Say that question again.

19 Q. In the last line, your reference to, quote,
20 potential biological underpinnings of gender identify,
21 by the word potential you are indicating that no
22 specific biological underpinning has yet been
23 identified.

24 Correct?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: So it's --- so no,
3 potential in this context does reference that most of
4 this biology is unknown, so that part is true, but it
5 doesn't mean that there is nothing known.

6 BY ATTORNEY BROOKS:

7 Q. You do not propose to offer any opinion that
8 natal males --- let me strike that and start again.

9 You do not propose to offer any opinion, do
10 you, that prior to puberty natal males who identify as
11 female are less athletic capable on average than natal
12 males who identify as male?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: I'm not offering an opinion
15 with regard to cisgender --- excuse me --- cisgender
16 boys versus transgender girls and their athleticism when
17 they are prepubertal. If that's what you are asking,
18 then yes, I'm not offering an opinion between those two
19 groups. I'm simply raising the possibility that
20 something like biology associated with transgender could
21 have influence into it.

22 BY ATTORNEY BROOKS:

23 Q. Let me ask you to turn to paragraph 22 of your
24 rebuttal report. And there you write Doctor Brown also

1 refers to widely publicized anecdotes about isolated
2 cases of transgender girls and women state championships
3 in high school sports or NCAA championships in college.
4 Do you see that?

5 A. I do.

6 Q. And you go on to write but transgender athletes
7 of women have been competing in NCAA and secondary
8 school athletics for many years at this point, closed
9 quote. Do you see that language?

10 A. I do.

11 Q. Let me ask you to name all instances of male
12 males known to you who have competed in women's division
13 varsity athletics in any athletic endeavor for any NCAA
14 member school?

15 ATTORNEY BLOCK: Objection to form and
16 scope.

17 THE WITNESS: Right, so I certainly can't
18 do that usefully off the top of my head, name
19 transgender women and all these context in such an
20 exhaustive way like that.

21 BY ATTORNEY BROOKS:

22 Q. Well, I asked you accused Doctor Brown of citing
23 isolated cases. Do you have any basis to assert that he
24 has done anything other than cite all cases in which

1 natal males have competed in NCAA athletics in the
2 female category?

3 A. So the --- if our focus is on the word isolated
4 then per se they are all --- these are all isolated
5 cases. These aren't systematic analyses of any cohort
6 of people.

7 Q. You are not accusing Doctor Brown of picking and
8 choosing?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: So let me think about that.

11 By simply choosing individual cases that are in the
12 press then it is by its nature picking and choosing.

13 BY ATTORNEY BROOKS:

14 Q. What do you mean by that?

15 A. Well, these are simply individual cases that
16 have --- that have come to public attention, and so I
17 --- so --- and that's the basis of my statement as
18 opposed to some exhaustive attempt to identify
19 transgender people in a systematic fashion.

20 Q. As you sit here today, Dr. Safer, are you aware
21 of a single case not mentioned by Doctor Brown in his
22 report of a natal male who has competed in NCAA
23 athletics in the women's category?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: Can I name somebody off the
2 top of my head? I cannot.

3 BY ATTORNEY BROOKS:

4 Q. Do you have any concrete --- leaving aside
5 whether you remember a precise name, do you have any
6 factual basis to know that Doctor Brown has omitted any
7 case of a natal male who has competed in the female
8 division of NCAA athletics?

9 ATTORNEY BLOCK: Objection to form.

10 THE WITNESS: So I guess if the question
11 is what can I do off the top of my head, then I cannot.

12 BY ATTORNEY BROOKS:

13 Q. Off the top of your head, you recall the case of
14 June Eastwood, do you not?

15 A. You have to remind me what that is.

16 Q. A runner in Montana?

17 A. I actually would need to be reminded of those
18 details.

19 Q. All right. Certainly you recall Lia Thomas
20 because none of us can mis Lia Thomas these days?

21 A. Lia Thomas is still in the news.

22 Q. Do you recall the case of CeCe Telfer?

23 A. Names are not my strength.

24 Q. All right. No more on that.

1 You say at the end of this paragraph, quote,
2 the occasional championship that has been widely
3 publicized do not come close to constituting the rates
4 one would expect if they, that is transgender athletes,
5 wanted rates that are proportional to their overall
6 percentage of the population, which is approximately one
7 percent. Do you see that language?

8 A. I do.

9 Q. Do you have any knowledge as to what --- first
10 of all, let me ask, what is your basis for believing
11 that the current student population in college and high
12 school level is approximately one percent transgender?

13 A. The statistic for the percentage of the
14 population who are transgender comes from surveys.

15 Q. And do you have any knowledge at all as to what
16 percentage of varsity athletes in America today at the
17 NCAA --- among NCAA member schools in the women's
18 division are transgender?

19 A. If the question is that a survey in that
20 population, I'm not aware of a survey that's been done.

21 Q. So you don't know whether the number of
22 victories of championships that have been taken in the
23 women's division by transgender competitors is higher or
24 lower than the percentage of athletes in those divisions

1 who are transgender?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: That is correct. I do not
4 know the percentage that --- what we know is the
5 percentage of transgender people and then we know the
6 percentage of identified athletes winning competitions.
7 And even then we don't know that absolutely. We only
8 know the ones that are publicized. But, right, in the
9 in between, we don't have statistics. That's right.

10 ATTORNEY BROOKS: Counsel, I'm going to
11 suggest --- in my experience, if we break for lunch at
12 noon, it makes it a little long afternoon. So I would
13 suggest that we take a short break now and then keep
14 going until like 12:45 or something. It's seven hours
15 on the clock and I'm here just to tell you that the
16 afternoon gets long. So unless you are starving I'd
17 recommend ---?

18 THE WITNESS: No, I think that's a great
19 idea.

20 ATTORNEY BROOKS: Take a short break now.

21 THE WITNESS: So you don't know who is on
22 the phone so give them a break.

23 ATTORNEY BROOKS: Let's go off the
24 record.

1 VIDEOGRAPHER: Going off the record. The
2 current time reads 12:01:00 p.m. Eastern Standard Time.

3 OFF VIDEOTAPE

4 ---

5 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

6 ---

7 ON VIDEOTAPE

8 VIDEOGRAPHER: Back on the record.

9 Current time reads 12:14 p.m. Eastern Standard Time.

10 ATTORNEY BROOKS: Let me mark as Safer

11 Exhibit 8 the Endocrine --- Treatment of Gender

12 Dysphoric Gender Incongruent Persons, an Endocrine

13 Society Clinical Practice Guidelines from 2017

14 previously marked as Adkins Exhibit 4.

15 ATTORNEY WILKINSON: Tab 5.

16 ---

17 (Whereupon, Exhibit 8, Endocrine Society

18 Guidelines, was marked for identification.)

19 ---

20 BY ATTORNEY BROOKS:

21 Q. And Doctor Safer, am I correct you served the

22 committee that created this revised version of the

23 Endocrine Society's Guidelines?

24 A. Yes.

1 Q. And is it reasonable for me to assume therefore
2 that you are familiar with it in some detail?

3 A. I am familiar with it in some detail.

4 Q. They also pertain to your practice?

5 Am I correct.

6 A. And they do pertain to my practice, yes.

7 Q. Let me ask you to turn in Exhibit-5 to Page 3879
8 --- Exhibit 8, 3879. And there I will call your
9 attention to the specific recommendation that's numbered
10 1.4. And it says there we recommend against puberty
11 blocking and gender-affirming hormone treatment in
12 prepubertal children with GD/gender incongruence.

13 Do you see that?

14 A. I do.

15 Q. And then there is a section headed evidence,
16 right?

17 A. Yes.

18 Q. And the first statement in the sentence that is
19 --- in the section headed evidence is, quote, in most
20 children diagnosed with GD/gender incongruence it did
21 not persist into adolescence, closed quote.

22 Do you see that?

23 A. I do.

24 Q. Do you believe that to be a false statement?

1 A. I wouldn't --- I guess it depends on context
2 here too. So as of when this was written, the
3 literature being referenced had a broader diagnosis for
4 gender dysphoria and gender incongruence or really
5 gender dysphoria is the label that was being used and
6 still is. Gender incongruence is where we are headed.
7 And so with that broader definition, that included
8 gender expansive children who were not necessarily
9 transgender.

10 Q. The statement is I think fairly specific. And
11 as you are aware, the discussion cites various
12 references, but the introductory sentence states in most
13 children diagnosed with GD a gender dysphoria or gender
14 incongruence did not persist into adolescence. Do you
15 believe to be a true statement or false statement?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: The problem is I can't
18 answer that quite that cleanly. The statement
19 references a circumstance that I just referenced where
20 children receiving that label have to --- for the most
21 part were not transgender. The only caution I want to
22 make is that as we grow more refined in our
23 understanding of gender identity and also in our
24 labeling, that we are more specific in identifying

1 transgender kids with these sorts of labels.

2 BY ATTORNEY BROOKS:

3 Q. Well, recommendation 1.4 says we recommend
4 against puberty blocking and a gender hormone treatment
5 in prepubertal children with gender dysphoria or gender
6 incongruence. Do you have an understanding of why these
7 Endocrine Society guidelines of which you're a co-author
8 recommended against puberty blocking in prepubertal
9 children?

10 A. Yes.

11 Q. Why?

12 A. They have no impact.

13 Q. Can you point me to anywhere in the evidence
14 discussion that suggests that is the reason for this
15 recommendation?

16 A. I don't know. Let me look.

17 Q. The evidence discussion is just two paragraphs.

18 ATTORNEY BLOCK: I just want to object to
19 the extent you're limiting his review to the evidence
20 section.

21 BY ATTORNEY BROOKS:

22 Q. My question pertains to the evidence section.

23 A. So those two paragraphs are both primarily
24 referencing 1.3 and not 1.4.

1 Q. Well, let me ask you to turn to page 3881. And
2 at the top of that first column on 3881 it reads we,
3 therefore, advise starting suppression in early puberty
4 to prevent irreversible development of undesirable
5 secondary sex characteristics. However, comma,
6 adolescents with gender dysphoria, slash, gender
7 incongruence should experience the first changes of
8 their endogenous puberty because their emotional
9 reaction to these first physical changes has diagnostic
10 value in establishing the persistence of gender
11 dysphoria/gender incongruence.

12 Do you see that language?

13 A. I do.

14 Q. And as a scientist and practitioner do you agree
15 with that statement?

16 A. I would say that the validity of that statement
17 is in evolution.

18 Q. In your practice, over time --- well, let me ask
19 you this. When this was drafted did you raise an
20 objection to the proposition that the child's emotional
21 reaction to the first physical changes of puberty had
22 important diagnostic value?

23 A. I cannot recall our specific conversations, but
24 if you're asking if my view has shifted since let's say

1 2015, 2016, 2017, no, the recognition that there is an
2 evolution was already part of my opinion.

3 Q. What do you mean the recognition that there is
4 an evolution about?

5 A. So the evolution is that whether there is a need
6 to start puberty as a diagnostic --- as a necessary
7 diagnostic circumstance.

8 Q. In your practice today do you prescribe puberty
9 blockers prior to Tanner Stage 2?

10 A. I --- so two things. My practice is with
11 adults. And although I will see older kids because I
12 don't have a hard threshold of age 18, but I don't
13 prescribe puberty blockers because I don't --- my
14 practice does not include those age children. But two,
15 it is still the guidance and so the pediatricians who
16 are part of my program do not prescribe puberty blockers
17 prior to Tanner 2 for the reason I stated initially.

18 Q. And according to these guidelines, by the time
19 you reach Tanner Stage 2 there have been sufficient
20 first pubertal --- stages of pubertal development to
21 give a chance to observe the child's reaction to
22 pubertal changes for diagnostic purposes.

23 Correct?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So the --- so I guess there
2 are kind of two pieces. The sentence is --- that
3 sentence is written, but that is the sentence that I'm
4 suggesting is an opinion that is in evolution, like I'm
5 saying, to whether that need really exists or not. The
6 reason why we still don't prescribe puberty blockers
7 before Tanner 2 is that there is no point, there is no
8 preventive element to puberty blockers and so there is
9 no point to give them before puberty begins and there is
10 no way to know that until there is an observable
11 objective finding.

12 Q. Has your own practice ever involved to a
13 significant extent treating prepubertal or early
14 pubertal stage children for gender dysphoria or gender
15 incongruence incongruence?

16 A. Have I personally cared for prepubertal children
17 who are transgender or otherwise? Actually, in the
18 subjects, no.

19 Q. And do physicians who do treat prepubertal
20 children report to you in connection with your position
21 at the clinic or the Mount Sinai Medical Hospital?

22 A. Yes.

23 Q. And do you know whether your clinic makes use of
24 children's emotional reactions to the first physical

1 changes of puberty as part of their process of
2 determining whether transgender hormonal therapies of
3 any sort are appropriate for that child?

4 A. Yeah, I can't give you give you an answer. I
5 would actually have to go survey my psychologists.

6 Q. Let me direct you to paragraph 17 of your
7 rebuttal report. And there you say in the second
8 sentence under current standards of care transgender
9 adolescents are eligible to receive puberty blockers
10 when they reach Tanner 2, not Tanner 3, which is early
11 enough to prevent endogenous puberty from taking place,
12 closed quote.

13 Do you see that?

14 A. I do.

15 Q. Now, just for context, you testified previously
16 that the large majority of minors I'll say who present
17 with gender incongruence or gender dysphoria are, in
18 fact, considerably older and have gone through at least
19 most of the Tanner stages.

20 Correct?

21 ATTORNEY BLOCK: Objection to
22 characterization.

23 THE WITNESS: Most of the people we are
24 seeing in clinical practice are coming to us at later

1 stages of development, yes.

2 BY ATTORNEY BROOKS:

3 Q. And so when we talk about prepubertal children,
4 we're talking about a small minority of the patients
5 coming in to ---?

6 A. I can't define small, but it is the minority,
7 that's correct.

8 Q. And do you believe that what your clinic is
9 seeing in that regard is typical of what's being seen
10 across the country these days?

11 A. So if I'm sitting here as an expert, I don't
12 have an expert survey to point to, to give you an answer
13 there.

14 Q. But you read the literature and you talk to
15 colleagues at other institutions.

16 Am I correct?

17 A. I certainly both read the literature and talk to
18 colleagues.

19 Q. And is it your current belief that what you are
20 seeing in terms of the breakdown of patient population
21 is similar to or quite different from what other major
22 gender clinics are experiencing?

23 A. So kind of separating, I'm living in my expert
24 role, I really want to point to data where I have any

1 confidence at all, and I have none. If you are asking
2 me in a more informal way among our conversations, then
3 I can answer that our experience seems similar to
4 others' experience.

5 Q. All right.

6 So in talking about prepubertal children ---
7 well, strike that. We've been through that.

8 In your rebuttal report when you said beginning
9 puberty blockers at Tanner stage 2 is early enough to
10 prevent endogenous puberty from taking place, let me ask
11 you, in consideration, do you believe it is accurate as
12 stated?

13 A. So Tanner 2 early enough to prevent endogenous
14 puberty from taking place, yes, that is accurate.

15 Q. You would agree with me, would you not, that the
16 endocrine guidelines of which you are a co-author
17 recommend to treat beginning puberty blockers at Tanner
18 Stage 2?

19 A. So to clarify, under the cited guidelines what
20 they say the recommendation is do not use puberty
21 blockers prior to puberty beginning, prior to Tanner 2.

22 Q. Let me direct you to recommendation 2.2 on
23 page 3880. Recommendation 2.2 reads we suggest the
24 clinicians begin pubertal hormone suppression after

1 girls and boys first exhibit physical changes of
2 puberty.

3 Do you see that?

4 A. I do.

5 Q. And then it says, paren, Tanner stages G2/B2
6 which is to say the girls Tanner 2 or boys Tanner 2,
7 correct?

8 A. That is what that means, yes.

9 Q. So the official recommendation from the
10 Endocrine Society is begin at or after Tanner Stage 2,
11 right?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: That is a correct.

14 BY ATTORNEY BROOKS:

15 Q. And it says that Tanner Stage 2 is defined as
16 girls and boys first exhibiting physical changes of
17 puberty.

18 Correct?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: The definition of Tanner 2,
21 is where there is any objective evidence when puberty
22 has begun.

23 BY ATTORNEY BROOKS:

24 Q. So in fact, beginning puberty blockers at Tanner

1 Stage 2 does not categorically prevent endogenous
2 puberty from taking place but instead prevents a
3 substantial portion of endogenous puberty from taking
4 place.

5 Correct?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: So let me ---.

8 BY ATTORNEY BROOKS:

9 Q. It is in paragraph 17.

10 A. So the --- I guess the way this is understood is
11 --- I guess it depends on how extreme you want to take
12 things. It is back to our original conversation of that
13 cause has to take place before effect. So it's parsing
14 it to that degree.

15 In a biological context it really is the case
16 that we need some objective evidence before we begin
17 things so that we don't make the mistake of using a
18 medication prior to its having any impact. And then
19 it's also true that some of the hormone mediated changes
20 that we see do actually regress to that prepubertal
21 state when we --- when you use puberty blockers at
22 Tanner 2. So the statement as written --- as I wrote it
23 is accurate in the way we think of these things in
24 biology.

1 Q. Although the guidelines specifically state that
2 adolescents should --- before puberty blockers, quote,
3 should experience the first changes of their endogenous,
4 spontaneous puberty. And the recommendation calls for
5 beginning puberty blockers, quote, after girls and boys
6 first exhibit physical changes at puberty, paren, Tanner
7 stages 2, closed paren. I'm not misreading anything, am
8 I?

9 ATTORNEY BLOCK: Objection to just
10 reading an excerpt.

11 THE WITNESS: Right. I don't know --- I
12 don't know if those were are all direct quotes or not so
13 I won't comment on whether you're misreading or not, but
14 the first statement that you reference, as I've said, is
15 one where there is an evolving understanding of its
16 veracity or its applicability.

17 The statement 2.2 is simply using
18 alternate phrasing for saying Tanner 2, that is we need
19 to have objective evidence that puberty is genuinely
20 beginning. The focus and the purpose of these
21 statements is to avoid people using puberty blockers on
22 non-pubertal kids.

23 BY ATTORNEY BROOKS:

24 Q. Well, you would agree with me, would you not,

1 that if one administer puberty blockers in accordance
2 with Endocrine Society guidelines, then some stages of
3 endogenous male puberty will have occurred in natal male
4 patients?

5 ATTORNEY BLOCK: Objection the form.

6 THE WITNESS: So when we are ---
7 specifically we're referencing transgender girls here.
8 And although pre-pubertis gender boys, when we see
9 Tanner 2, then some --- some degree of development has
10 taken place. That part is true. So in the absolute
11 sense, then yes. But in a biological sense, like I said
12 already, the --- some interesting reality is that some
13 of that does regress.

14 BY ATTORNEY BROOKS:

15 Q. By the way, you, yourself, do not have any
16 knowledge as to what developments of endogenous male
17 puberty BPJ underwent prior to initiating puberty
18 blockers, do you?

19 A. I have had no physical contact with BPJ.

20 Q. Nor have you studied BPJ's chart sufficiently to
21 be feel that you know the answer to that question?

22 A. Right, I'm not expressing any opinion to the
23 specific medical terms, that's right.

24 Q. Have you, yourself, ever supervised any

1 research, clinical research, concerning treatment of
2 prepubertal children for gender dysphoria or gender
3 incongruence?

4 A. Have I supervised research on treatment of
5 prepubertal transgender girls? Let me think about that.
6 Nothing is coming to mind, but our program does do
7 research across an age span.

8 Q. Well, some of your colleagues might have done
9 such research, but my question is whether you have been
10 personally supervised or involved in such research?

11 A. I'm pretty involved actually, especially in our
12 research program, but I'm having a difficult time coming
13 up with an example.

14 Q. All right.

15 I just want to make sure I know about it if it
16 exists.

17 A. Yes.

18 ATTORNEY BROOKS: Let me mark as Safer
19 Exhibit 9 an article entitled --- an article or a
20 chapter or something entitled Care of the Transgender
21 Patient dated 2019 by Dr. Safer and by Doctor Vin
22 Tangpricha.

23 ---

24 (Whereupon, Exhibit 9, Care of the

1 Transgender Patient Article, was marked
2 for identification.)

3 ---

4 BY ATTORNEY BROOKS:

5 Q. Am I correct that this is --- well, you tell me,
6 is this an article or book chapter? How would you
7 describe this document?

8 A. This is a review article from the Annals of
9 Internal Medicine.

10 Q. And by review you mean it's not reporting on
11 original research but rather summarizing the state of
12 knowledge in a particular area?

13 A. That is correct.

14 Q. Okay.

15 And the pages may have ITC and a number, but
16 I'll just refer to the number if I may. On page three,
17 column two, is a statement that I think is just
18 repeating what you told me, that is most --- quote, most
19 transgender persons present to clinicians in late
20 adolescence or adulthood, closed quote. That is
21 consistent with what you testified earlier.

22 Correct?

23 A. That is, yes.

24 Q. And if you turn then to page five, column two,

1 you write in the first full sentence in column two,
2 prior effects of androgens on the skeleton height and
3 size and shape of the hands, feet, jaw and pelvis and
4 voice, including visibly --- visible laryngeal
5 prominence, will not be altered if treatment is
6 initiated after puberty.

7 Do you see that language?

8 A. I do.

9 Q. And is it consistent with your understanding
10 that at this stage also changes to the size of the heart
11 and the lungs will not be altered if testosterone is
12 commenced after the initiation of puberty?

13 A. Not quite.

14 Q. Explain that to me, please.

15 A. So transgender women, if they have gone through
16 a typical male puberty, are going to remain larger, but
17 the testosterone has action on certain tissues, so
18 specifically muscle, and that --- when those
19 testosterone levels shrink, then that muscle shrinks and
20 the heart muscle is --- well, the heart is a muscle, so
21 it will be --- there will be an impact from body size,
22 but there will also be impact from the lower level of
23 testosterone. So it will be kind of a mix of those two.

24 Q. The heart is a muscle but it has in it cavities

1 of a certain size in which blood flows, out of which
2 blood is pumped, correct? Do you have any knowledge,
3 are you aware of any literature that documents that
4 testosterone suppression reduces the heart's pumping
5 capacity?

6 ATTORNEY BLOCK: Objection to form.

7 THE WITNESS: So the --- so there is a
8 gap there of transgender research --- so no, that is
9 something that's not been studied.

10 BY ATTORNEY BROOKS:

11 Q. And the lungs are not muscle tissue. Are you
12 aware of any science that indicates or even suggests to
13 you as an expert that an individual who has gone through
14 typical male puberty, that individual's lungs reduce in
15 size if testosterone is suppressed?

16 A. So the answer with regard to lungs is going to
17 have some of those same inputs as heart or other tissues
18 actually where overall size of the individual is not ---
19 well, certainly height at least is not decreasing, and
20 so this person is larger. And so lung size matches that
21 to some degree. And testosterone has some impact on
22 surrounding muscle. And so to the degree that that
23 shrinks there might be lung shrinking too. And so you
24 hear that --- that is going to be a complex answer. And

1 in terms of interpreting it even, you then would also
2 have to interpret it in the context of the size of the
3 body if you want to consider function, and none of this
4 has been studied.

5 Q. Certainly you don't believe, do you, that an
6 individual who has been --- let me start that again. It
7 is not your opinion, is it, that testosterone
8 suppression by an individual who has been through a
9 typical male puberty reduces that individuals VO2 mass
10 to typical female levels?

11 A. So the more we get into some of the subtler
12 physiology, I will take a step back and give you an
13 expert opinion, but I will --- in addition to that point
14 out that we don't even have studies on this. We're just
15 at a stage of beginning to look at that sort of thing.

16 ATTORNEY BLOCK: Roger, are you able to
17 speak up a little?

18 ATTORNEY BROOKS: I will try.

19 BY ATTORNEY BROOKS:

20 Q. You state that in paragraph 55 of your expert
21 report, Exhibit 1?

22 A. So paragraph 55.

23 Q. Fifty-five (55). You state that there are,
24 quote, only two studies examining the effect of

1 gender-affirming hormone therapy on athletic
2 performance, closed quote. Do you see that?

3 A. Yes.

4 Q. You are aware, are you not, that there are a
5 substantially larger number of studies that examine the
6 effect of testosterone suppression on strength or muscle
7 mass in natal males?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: There are --- there are a
10 handful of studies on the impact of testosterone
11 lowering treatment on transgender women on some tissues,
12 yes.

13 BY ATTORNEY BROOKS:

14 Q. Well --- and not to get carried away with the
15 terminology, there are also studies that relate to
16 application of testosterone suppression to males who
17 don't identify as transgender, are there not?

18 A. To cisgender men in addition to transgender
19 women there are some studies --- yes, there are actually
20 some modest studies, yes, on cisgender men.

21 Q. And have you now taken some care to review
22 yourself all the peer-reviewed studies of that type that
23 were cited in Doctor Brown's report?

24 A. I have looked at papers that were cited by

1 Doctor Brown. The moment we use the word all I
2 hesitate, but certainly I've read through the papers
3 that were cited.

4 ATTORNEY BROOKS: Well, let's start with
5 one you referenced, article by Roberts, et al., from
6 2020, which I will mark as Exhibit --- Safer Exhibit-10.

7 COURT REPORTER: 10.

8 ATTORNEY WILKINSON: 10, Tab 60.

9 ---

10 (Whereupon, Exhibit 10, Roberts, et al,
11 Articles, was marked for
12 identification.)

13 BY ATTORNEY BROOKS:

14 Q. And in fact, this is one of only very few
15 articles that you cite in your expert report start to
16 finish.

17 Correct?

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: So this paper is referenced
20 to an expert report.

21 BY ATTORNEY BROOKS:

22 Q. Let me direct you to the last page of your
23 expert report where there is a bibliography. And other
24 than citing to your own writings as the entire basis of

1 your opinions you cited only six articles.

2 Correct?

3 ATTORNEY BLOCK: Objection to
4 characterization about its entire cases for his
5 opinions.

6 THE WITNESS: So the paper specifically
7 referenced two reviews and six papers but recognized
8 that some of these papers specifically are summaries of
9 the topic.

10 BY ATTORNEY BROOKS:

11 Q. You have studied the Roberts 2020 article with
12 some care.

13 Is that correct?

14 A. I have indeed, yes.

15 Q. And so far as you know it is the only
16 longitudinal study of the impact of testosterone
17 suppression in natal males and actual athletic
18 performance and in this case running.

19 Correct?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So the Roberts study and
22 the Harper study are both studies of transgender women
23 with at least two time points.

24 BY ATTORNEY BROOKS:

1 Q. The Harper study is strictly retrospective, it
2 is not a prospective, longitudinal study?

3 A. The Harper study is --- that's a good question.
4 I actually don't know if it is --- it's probably mixed,
5 honestly.

6 Q. Well, we can look at it, but it is not mixed.
7 It is a one-time survey.

8 A. Well, to be clear, the way we phrase these
9 things sometimes are --- I'm trying to be --- are
10 according to certain conventions academically, so that
11 sometimes it will be framed that way because from an
12 academic perspective we'll use that context, but I think
13 some of the data was actually collected in both
14 collections.

15 Q. The Roberts study you understand to be a
16 prospective, longitudinal study, do you not?

17 A. Well, actually, you are testing me on that. Did
18 they set out at the beginning to do it or did they go
19 back and look? I'd have to see.

20 Q. Well, based on the method, I think the answer is
21 they went back and looked because it begins we reviewed?

22 A. Yes.

23 Q. Do you --- is it your opinion that amongst the
24 available data, the Roberts study is --- on the impact

1 of testosterone on athletic performance is some of the
2 strongest data that we have available?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: It is my opinion that the
5 Roberts and Harper studies are the only two studies that
6 we have available.

7 BY ATTORNEY BROOKS:

8 Q. Is it your opinion as an expert, is it not, that
9 the structure of the Roberts study renders it --- and
10 the source of its data renders it far more reliable than
11 the Harper 2015 study?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: I would not overstate that,
14 so no. If I'm being --- if I'm being professorial and
15 saying this is how to organize something, then in that
16 context I might say that, but in terms of simply
17 believability of data, I got two modest papers that are
18 the sum of the world literature on the subject.

19 BY ATTORNEY BROOKS:

20 Q. You say in paragraph 56 of your report that
21 Roberts found, quote, after two years of
22 gender-affirming hormone therapy transgender women
23 completed the 1.5 mile run 12 percent faster on average
24 than non-transgender women, closed quote. Do you see

1 that?

2 ATTORNEY BLOCK: I think he needs some
3 time to get ---.

4 THE WITNESS: Yeah, to actually find
5 the ---.

6 BY ATTORNEY BROOKS:

7 Q. Paragraph 56. And I will refer you to the third
8 sentence.

9 A. All right.

10 Sorry say that again.

11 Q. I'm simply calling your attention to the place
12 where you wrote at the Roberts report that after two
13 years of a gender-affirming hormone therapy transgender
14 women completed the 1.5 mile run 12 percent faster on
15 average than non-transgender women.

16 A. Yes.

17 Q. And two years, not a trick question here, twice
18 as long as the one year testosterone suppression
19 requirement that led to the NCAA rule.

20 Correct?

21 A. Two years is twice one year, yes.

22 Q. And you would agree with me that a 12 percent
23 faster in women's time is a substantial advantage?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So this is a bit --- this
2 is a bit of the same conversation. I guess I can't say
3 that in a blanket way. It depends on context.

4 BY ATTORNEY BROOKS:

5 Q. The context here is that that these are all Air
6 Force members, do you recall?

7 A. I believe they are all Air Force members, yes.

8 Q. All subject to Air Force physical fitness
9 requirements. So we are not talking about couch
10 potatoes?

11 A. I'm not rendering an opinion there as an expert.

12 Q. Generally you would accept that this is a
13 relatively fit population?

14 A. I can't even render an opinion there as an
15 expert.

16 Q. Do you have some unhealthy relative who's a
17 member of the armed forces?

18 A. I was in the National Guard, so I do have some
19 insight.

20 Q. Okay.

21 You would agree, would you not, that running
22 speed and endurance, per se, are relevant to quite a
23 number of sports?

24 A. Running speed and endurance are relevant to many

1 sports. I'm certain that is true. I'm not ---

2 Q. Well ---.

3 A. --- an expert again.

4 Q. I'm no sports fan, but we've all seen enough
5 sports to know there's a lot of running involved not
6 just in track but in basketball, soccer, lacrosse and
7 field hockey.

8 Correct?

9 A. I have observed that, yes. But again, I'm not
10 rendering an expert opinion there, but yes.

11 Q. And on page six of this paper ---.

12 A. This is Roberts.

13 Q. Yes, Roberts and Exhibit 10. Roberts and his
14 co-authors summarize in their conclusion by stating,
15 quote, in this study we confirm that the use of gender
16 affirming hormones are associated with changes in
17 athletic performance and demonstrated that the
18 pretreatment differences between a transgender and a
19 cisgender woman persist beyond the 12-month time
20 currently --- requirement currently being proposed for
21 athletic competition by the World Athletics and the IOC.
22 Do you see that?

23 A. This is the conclusion section?

24 Q. It is.

1 A. Yes, I see that.

2 Q. And you don't have any expert opinions that the
3 findings of Roberts are inaccurate or unreliable, do
4 you?

5 A. So the --- this is again a question of context.
6 So I have no reason to suspect that these data are
7 suspect. The only question then is what we conclude
8 when you do a study of --- for the transgender women I
9 think we are talking about 29 people, which I certainly
10 like a lot better than simply pointing to a random
11 individual, but I recognize as also simply 29
12 individuals in a certain circumstance that might or
13 might not be replicated as we do this again and increase
14 the numbers of people that we evaluate.

15 Q. You don't propose to offer any expert opinion
16 that the findings of Roberts as reported in this paper
17 of 2020 are inaccurate?

18 A. So, I guess the way I said it is how I said it
19 already, which is I'm not doubting Roberts' data, but I
20 wouldn't then over generalize to say that I know that
21 these would be the findings we would see in every
22 similar circumstance.

23 Q. And are you aware that one common track event or
24 cross-country event, I can never keep them straight, is

1 the 1600 meter, which is about a mile?

2 A. Actually, that is not my expertise. I believe
3 you.

4 Q. Are you aware that the 3,000 meter, a 1.8 mile
5 distance, is a standard event?

6 A. If you are meaning to quiz me on the standard
7 lengths these days and meters and all of that, no.

8 ATTORNEY BROOKS: Well, I can't complete
9 my next document in two minutes, we if we want to break
10 at 1:00 now or I can do one more document.

11 ATTORNEY BLOCK: I'm fine continuing if
12 you are.

13 THE WITNESS: My bias is to push.

14 ATTORNEY BROOKS: Folks online, we're
15 going to continue a little bit farther.

16 BY ATTORNEY BROOKS:

17 Q. You cited a paper by Harper from 2015. And that
18 paper also I take it you studied with some detail?

19 A. Yes.

20 Q. And how many individuals did Harper have in that
21 study?

22 A. I --- do we have her ---?

23 Q. Everything that you mention I have.

24 ATTORNEY BROOKS: Let me mark as Safer

1 Exhibit 11 ---

2 ATTORNEY WILKINSON: Yes.

3 ATTORNEY BROOKS: --- Harper's --- Harper
4 et al. or just Harper, article Race Times for
5 Transgender Athletes from 2015.

6 ATTORNEY WILKINSON: Tab 61.

7 ---

8 (Whereupon, Exhibit 11, Race Times for
9 Transgender Athletes Article, was marked for
10 identification.)

11 ---

12 THE WITNESS: Thank you.

13 BY ATTORNEY BROOKS:

14 Q. You say you have worked with Joanna Harper, you
15 are aware that Dr. Harper is both an athlete and
16 transgender?

17 ATTORNEY BLOCK: Objection to form.

18 THE WITNESS: I am aware. I am aware
19 that she is an athlete, and I'm aware that she is
20 transgender.

21 BY ATTORNEY BROOKS:

22 Q. Did you have after studying the paper end up
23 with an understanding of how many participants there
24 were?

1 A. There were eight participants. I'm looking at
2 Table 5.

3 Q. Did you have an understanding of how those
4 participants were recruited?

5 A. I do have some understanding of that, yes.

6 Q. How is that?

7 A. The --- how would I characterize this? It's
8 somewhat ad hoc in the sense that Ms. Harper is in the
9 category of these other participants, and so she was
10 able to identify others that met the criteria of being
11 both transgender and being sufficiently intense in their
12 middle distance running that they had race times that
13 they could identify that would allow for the --- for
14 these determinations of age based --- I don't know all
15 the terminology here, but their age-based grade
16 proportional to others in that same sex category.

17 Q. And it is consistent with your understanding, is
18 it not, that all of the information in this study about
19 what hormonal treatment these individuals had undergone
20 was self reported?

21 A. This is --- the entire study is self report,
22 that is she didn't have --- Ms. Harper did not have
23 access to people's individual records independently.

24 Q. So there was no independent confirmation of how

1 long that they had suppressed testosterone.

2 Correct?

3 A. There was no independent confirmation beyond Ms.
4 Harper and her dealing with other subjects directly.

5 Q. Well, in your view as a scientist, that's not
6 independent confirmation, is it?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: So I'm not expressing an
9 opinion there because in a science --- you know, in a
10 scientific paper we would have --- we would have peer
11 review, but we don't --- that just --- ends up being a
12 little bit of a fuzzy realty.

13 BY ATTORNEY BROOKS:

14 Q. There is no information in this paper about what
15 testosterone levels were achieved by any of these
16 individuals as a result of suppression, is there?

17 A. I don't know. Let's --- I can look through that
18 a little bit because does she reference how many of them
19 have had surgery and such? It has been quite a while,
20 you know. So notably, there is some independent
21 confirmation of some of the data because some of this
22 was posted.

23 Q. Wait. Let me just be clear. Some of the times
24 were verified independently.

1 Correct?

2 A. That's correct.

3 Q. Nothing about the hormonal treatment?

4 A. Right.

5 ATTORNEY BLOCK: Do you want to give him
6 a chance to review it?

7 BY ATTORNEY BROOKS:

8 Q. Doctor Safer, let me just withdraw that question
9 and ask you another question.

10 A. Yeah, go ahead.

11 Q. Do you know whether Doctor Harper stands behind
12 the conclusions of her 2015 paper today?

13 A. If you ask me do I know it, that's too strong a
14 statement.

15 ATTORNEY BROOKS: Let me mark as Safer
16 Exhibit 12 an article by Joanna Harper and others from
17 2021 entitled How Does Hormone Transition in Transgender
18 Women Change Body Composition, Muscle Strength and
19 Hemoglobin.

20 ATTORNEY WILKINSON: Tab 21.

21 ---

22 (Whereupon, Exhibit 12, Joanna Harper
23 Article, was marked for identification.)

24 ---

1 BY ATTORNEY BROOKS:

2 Q. Dr. Safer, have we put that in front of you?

3 Yes, we have. Are you familiar with this article?

4 A. I am.

5 Q. And have you read it, reviewed it recently?

6 A. I have reviewed it relatively recently.

7 Q. And do you understand, and I didn't completely
8 read the title. The second sentence of the title says
9 Systematic Review with the Focus on Implications for
10 Sport Participation.

11 Do you see that?

12 A. I do.

13 Q. Can you tell me why when you cited Harper's 2015
14 paper that you just referred to as older science you
15 didn't cite Harper's 2021 publication?

16 A. So to be clear, I didn't use the older science.
17 I simply referenced Harper's paper as one of the only
18 two papers on the subject. And your question?

19 Q. Why didn't you cite Harper's 2021 paper on the
20 topic?

21 A. So this paper is more in the category of the
22 papers looking at impact on tissues of which there are
23 several papers as opposed to actually investigating a
24 specific activity, a person's activity. And does this

1 have primary data in it?

2 Q. Well, let me take you to page eight.

3 A. Yeah, I don't even think this has a final data
4 in it.

5 Q. Describing the Roberts study, Harper here on
6 page eight, column one, about halfway down, summarizes
7 as follows: Quote, trans women ran significantly faster
8 during the 1.5 mile fitness test than ciswomen. These
9 observations in trained transgender individuals are
10 consistent with the finding of the current review in
11 untrained individuals whereby 30 months of gender
12 affirming hormone therapy maybe sufficient to attenuate
13 some but all influencing factors associated with
14 muscular endurance and performance, closed quote.

15 Do you see that?

16 A. Yes. This is the end of the paragraph there?

17 Q. Yes.

18 A. We're starting with these observations, yes, I
19 see that.

20 Q. And do you propose to offer any expert opinion
21 inconsistent with Joanna Harper's summary of the data
22 here suggesting that 30 months of gender affirming
23 hormone therapy may be sufficient to attenuate some but
24 not all influencing factors associated with muscular

1 endurance and performance?

2 A. The statement here is too broad, so it's simply
3 raising questions.

4 Q. Well, Joanna Harper says here that the findings
5 of her current review were that 30 months of gender
6 affirming hormone therapy may be sufficient to attenuate
7 some but not all influencing factors associated with
8 muscular endurance and performance?

9 ATTORNEY BLOCK: Objection to leaving out
10 words of what you quoted.

11 BY ATTORNEY BROOKS:

12 Q. And my question for you is do you intend to
13 offer an expert opinion that you believe is inconsistent
14 with that statement?

15 ATTORNEY BLOCK: Same objection. It's
16 misquoting the document.

17 THE WITNESS: So the operative or
18 inoperative word here is may be sufficient, and so when
19 we're --- these are research questions as we try to
20 understand physiology and the relevance of certain
21 testosterone levels at certain endpoints and then not
22 just endpoints as surrogates, which is what most of the
23 papers to date still are, but endpoints in actual
24 athleticism and athletic competition. And so that's all

1 this is doing is putting out some questions or some
2 potential thoughts.

3 BY ATTORNEY BROOKS:

4 Q. Let me ask you to turn to page one and column
5 one.

6 A. Of this same paper?

7 Q. Of the same paper. In the conclusion of the
8 abstract the last sentence reads, quote, these findings
9 suggest the strength may be well be preserved in trans
10 women during the first three years of hormone therapy,
11 closed quote.

12 Do you see that?

13 A. I do.

14 Q. And having reviewed whatever literature you have
15 reviewed to date do you share Doctor Harper's
16 understanding that strength may well be preserved in
17 trans women during the first three years of hormone
18 therapy?

19 ATTORNEY BLOCK: Objection to misquoting
20 the document.

21 THE WITNESS: So I can't comment on Ms.
22 Harper's understanding, but if you're asking is that ---
23 you know, is the question a question, so the question is
24 a question. These findings suggest that strength may

1 and again an operative word is may.

2 BY ATTORNEY BROOKS:

3 Q. Yes.

4 A. And these are as I, a scientist, and she is a
5 scientist too, we are turning the earth, as it were, of
6 what we know looking for what questions we might want to
7 study and how we might want to frame studies going
8 forward.

9 Q. Let me take you back to page eight, if I may.
10 And the penultimate sentence of this paper at the bottom
11 of the first column of paragraph of page eight reads,
12 quote --- well, let me read --- yeah, I will just read
13 that, quote, whether transgender and cisgender women can
14 engage in meaningful sport even after gender affirming
15 hormone therapy is a highly debated question, closed
16 quote.

17 Do you see that language?

18 A. I do.

19 Q. You'll agree that up to the present that is a
20 highly debated question?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: There's context there too.

23 So this is referencing a league sport and it's --- as
24 well there are a range of potential sports, and so the

1 question and the degree to which it is highly debated
2 even I'm not going to render an official opinion there.
3 So the --- whether transgender and cisgender women can
4 engage in meaningful sport depends on what sport we're
5 talking about, what treatment we're talking about, age
6 group, whether elite versus more of an intermural
7 setting. And so it's just a relatively simple statement
8 and to summarize a paper I guess.

9 BY ATTORNEY BROOKS:

10 Q. You agree that this --- that is the question of
11 whether transgender and cisgender women can engage in
12 meaningful sport even after gender affirming hormone
13 therapy is one on which reasonable scientists can
14 disagree and today are disagreeing?

15 ATTORNEY BLOCK: Objection to form.

16 THE WITNESS: So going back --- so is
17 your --- so are you asking me --- I guess help me
18 reframe what the question is there because there are a
19 bunch of things packed into that sentence actually. And
20 you heard me try to unpack them both.

21 BY ATTORNEY BROOKS:

22 Q. That may be a complex question, as debated
23 questions often are, but my question is do you agree
24 that the question of whether transgender and cisgender

1 women can engage in meaningful sport even after gender
2 affirming hormone therapy is one on which reasonable
3 scientists can differ and are differing today given the
4 possibility of data?

5 ATTORNEY BLOCK: Objection to form for
6 the same reasons.

7 THE WITNESS: So I'm sitting here as a
8 scientist talking about differences in athleticism and
9 such and whether --- and so moving onto meaningful sport
10 goes beyond my expertise. I'm only putting data
11 together in a --- that's my lane on this subject.

12 ATTORNEY BROOKS: Okay.

13 Let's break for lunch.

14 ATTORNEY BLOCK: Let's go off the record,
15 so 2:15.

16 ATTORNEY BROOKS: 2:15? Any dissent? No
17 dissent.

18 VIDEOGRAPHER: Going off the record. The
19 current time is 1:16 p.m. Eastern Standard Time.

20 OFF VIDEOTAPE

21 ---

22 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

23 ---

24 ON VIDEOTAPE

1 VIDEOGRAPHER: Back on the record. The
2 current time is 2:18 p.m. Eastern Standard Time.

3 BY ATTORNEY BROOKS:

4 Q. Good afternoon, Dr. Safer. Take you back into
5 context, I'm going to ask you to find your expert
6 report, Exhibit-1, and find paragraph 25, which we have
7 looked at before. And there in the third sentence it
8 reads based on current research comparing
9 non-transgender boys and men with non-transgender girls
10 and women before, during and after puberty the primary
11 known biological driver of these average group
12 differences is testosterone starting at puberty, and not
13 reproductive biology or genetics, period, closed quote.

14 Do you see that language?

15 A. Yes.

16 Q. And your one cite for that is the endocrine that
17 we've already looked at already.

18 Right?

19 ATTORNEY BLOCK: Objection to the form.

20 THE WITNESS: So the citation in that
21 paragraph is the Handelsman, yes.

22 BY ATTORNEY BROOKS:

23 Q. And do you recall our earlier discussion about
24 how the effects of testosterone are cumulative over time

1 rather than depending solely on the testosterone level
2 of an individual at a particular time, right? Do you
3 recall that discussion?

4 A. So the impact --- excuse me, the impact of
5 testosterone is cumulative. It depends what impacts
6 we're talking about. So there are impacts that are
7 cumulative, like height, and there are impacts that
8 really do reflect that point in time.

9 Q. Now, at the moment let me ask just based on your
10 recollection. The Handelsman article is Exhibit-4. Do
11 you have that? And I will ask you to find it in your
12 pile. I should have neated up your pile of exhibits
13 while you were out. That looks like it.

14 A. Got it, yes.

15 Q. The Handelsman article, as far as you recall,
16 does not contain any data or conclusions concerning the
17 effects of testosterone after the beginning of male
18 puberty, does it?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: Honestly, I would have to
21 go look carefully.

22 BY ATTORNEY BROOKS:

23 Q. Then I won't take time to do that.

24 A. Okay.

1 Q. It does or it doesn't. We will deal with that.

2 A. Yes.

3 Q. Do you know whether any other writing Professor
4 Handelsman has expressed any view as to whether
5 testosterone suppression after male puberty eliminates
6 sex-based physical advantages sufficiently to maintain
7 fairness in sports for women?

8 ATTORNEY BLOCK: Objection to the form.

9 THE WITNESS: So first of all, putting it
10 altogether that way isn't necessarily how I would say it
11 or how I would expect it to be said. It would be
12 testosterone suppression and whatever the scientific
13 finding at the moment would be. So we already know that
14 the data that relate to athleticism are just the Roberts
15 paper and the Harper paper, so I guess that is as much
16 as I can say in that particular context. And in terms
17 of --- so yes, I think that it wouldn't be --- I forgot
18 already how you phrased that.

19 BY ATTORNEY BROOKS:

20 Q. Let me just ask again.

21 A. Yes.

22 Q. So the first question is not a hard one.

23 A. Okay.

24 Q. Do you know whether Professor Handelsman has

1 himself in his publication expressed any view whether
2 testosterone suppression after male puberty eliminates
3 sex-based physical advantages sufficiently to maintain
4 fairness in sports for women?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: So I don't know if he has
7 written something covering all those bases that you just
8 described, how you described it.

9 ATTORNEY BROOKS: All right. Let's look
10 at treatment variable. Let me mark as Exhibit 13 a
11 short article by Dr. Roberts with a subsequent comment
12 by David Handelsman.

13 ATTORNEY WILKINSON: Tab 62.

14 ATTORNEY BROOKS: And unfortunately, the
15 words were a little clipped on this. We will see how we
16 do.

17 ---

18 (Whereupon, Exhibit 13, Dr. Roberts Article, was
19 marked for identification.)

20 ---

21 ATTORNEY BLOCK: Thanks.

22 BY ATTORNEY BROOKS:

23 Q. And I think a fair description of what we have
24 here is a relatively popular press type piece by Dr.

1 Roberts first. And this document is dated December 16,
2 2020.

3 ATTORNEY BLOCK: Objection. Does it say
4 where it was published?

5 ATTORNEY BROOKS: No, it doesn't say on
6 its face where it was published. And as we sit here
7 right now I don't recall, though actually looking at it
8 I do recall that Kilio is an online publication of some
9 sort, and I've seen the brand came from the Kilio
10 website.

11 BY ATTORNEY BROOKS:

12 Q. At any rate, I see the date, I see the title.
13 It purports to be an article by Professor Roberts. I
14 just want to be clear in my description it does not ---
15 it does not have the appearance of a separate peer
16 review article since the summary taken off of the
17 article that we've already looked at. And then at the
18 end of it is a two-paragraph prospective on this offered
19 by Dr. Handelsman.

20 Do you see that?

21 A. I do.

22 Q. And he begins by making clear that he is
23 commenting on this study, that is Roberts study that is
24 discussed above. He is not introducing new science,

1 correct, is that consistent with your understanding?

2 ATTORNEY BLOCK: Objection. Give him a
3 chance to read it.

4 THE WITNESS: So that, yes, my
5 understanding, too, is that there is not new data here,
6 mostly a commentary within the context some of our
7 existing knowledge on the Roberts study.

8 BY ATTORNEY BROOKS:

9 Q. And in his comment to Dr. Handelsman states in
10 the second paragraph, as of 2020, quote, a major
11 question remains whether gender affirming hormone
12 treatment overcomes sex-based physical advantages
13 sufficiently to maintain fairness so that an exception
14 can be made for trans women, paren, natal males, closed
15 paren, treated with estrogen.

16 Do you see that language?

17 A. I do.

18 ATTORNEY BLOCK: Objection. I believe
19 that is what it says, but I just want to note for the
20 record that there is text cut off on the left.

21 ATTORNEY BROOKS: There is. And I'll get
22 better copies. I'm looking at a copy that's not cut off
23 I will represent.

24 BY ATTORNEY BROOKS:

1 Q. And do you have an expert opinion as to ---
2 well, do you propose to offer any opinion disagreeing
3 with Professor Handelsman that as of 2020 it remained a
4 major question whether gender affirming hormone
5 treatment to overcome sex-based physical advantages
6 sufficiently to maintain fairness so that an exception
7 could be made for trans women treated with estrogen?

8 A. So to me that's too broad a question if you're
9 asking me to render an expert opinion about his opinion.

10 Q. I'm asking whether you propose to offer an
11 expert opinion inconsistent with his view that remains a
12 major question as of 2020.

13 A. It's --- I might --- well, I would at least
14 phrase things differently in there --- we might have to
15 go through pieces of it because certainly where we lack
16 data I think we would agree, but in terms of those
17 statements that then go on to editorialize, I don't know
18 that we necessarily agree in how we would frame that.

19 Q. A little farther down, maybe two sentences down
20 it reads, quote, by contrast, trans women treated with
21 estrogens after completing male puberty experienced only
22 minimal declines in physical performance over 12 months,
23 substantially surpassing average female performance for
24 up to eight years, closed quote. Do you agree or

1 disagree with Professor Handelsman summary of the
2 findings of Roberts?

3 ATTORNEY BLOCK: Objection to form. I'm
4 just not sure it's all based on Roberts?

5 THE WITNESS: It is not clear to me that
6 it's --- that it is based on Roberts for what it's
7 worth. It's also somewhat simplistically written. And
8 an example is we don't --- the contention with regard to
9 athletic outcomes relates more to testosterone, and so
10 saying transgender women treated with estrogens wouldn't
11 be precisely how I would frame that either.

12 BY ATTORNEY BROOKS:

13 Q. He concludes --- Professor Handelsman concludes
14 by stating supporting federations should incorporate
15 these findings in the strategies for including trans
16 women in elite female competitions while maintaining
17 fairness and safety for other women. Dr. Safer, do you
18 agree that maintaining safety for cisgender women is a
19 legitimate and indeed important concern?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: As an expert I'm not going
22 to give an opinion.

23 BY ATTORNEY BROOKS:

24 Q. As Doctor Safer do you agree that ensuring

1 safety for cisgender women and girls is a legitimate
2 concern?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: So if I'm simply speaking
5 not as an expert, just as an educated person in the
6 field, then it is true that safety is important, but I'm
7 not clear that --- I don't know that in most of these
8 athletic activities it's actually a concern.

9 ATTORNEY BROOKS: Let me mark as Safer
10 Exhibit 14 a document entitled Guidance with Transgender
11 Inclusion in Domestic Sport with symbols of a number of
12 UK sport governing bodies across the front and a
13 statement published September 2021.

14 ATTORNEY WILKINSON: Tab 22.

15 ---

16 (Whereupon, Exhibit 14, Guidance with
17 Transgender Inclusion in Domestic Sport,
18 marked for identification.)

19 ---

20 THE WITNESS: Thank you.

21 BY ATTORNEY BROOKS:

22 Q. And my first question for you, Dr. Safer, is
23 whether you have seen this document before?

24 A. I have seen this document before.

1 Q. And were you aware of it prior to its reference
2 in this litigation?

3 A. I don't know that I was.

4 Q. And are you familiar with the role of the
5 supporting body mentioned on the front page in
6 governance of sport within the United Kingdom?

7 A. By looking at all their logos, I cannot say that
8 I know them all, no.

9 Q. And do you have any knowledge as to whether
10 these are official government chartered --- chartered
11 sporting governing bodies?

12 A. I do not have that knowledge.

13 Q. Have you now studied this document with some
14 care?

15 A. I would say that I have only looked at this
16 document superficially. I'm certainly happy to look
17 through it.

18 Q. I will ask you just about a couple of passages.
19 Let me ask you to turn to page three of the document.
20 And towards the very bottom and the next to the last
21 paragraph this --- five organizations states, quote, our
22 work exploring the latest research, evidence and studies
23 made clear that there are retained differences in
24 strength, stamina and physique between the average women

1 compared with the average transgender women for
2 nonbinary person registered male at birth with or
3 without testosterone suppression.

4 Do you see that language?

5 A. I do.

6 Q. And do you disagree with the conclusion of these
7 UK sporting bodies that the latest research, evidence
8 and studies now make clear that there are retained
9 differences in strength, stamina and physique in
10 nonbinary --- in transgender women or nonbinary persons
11 registered male at birth with or without testosterone?

12 ATTORNEY BLOCK: Objection to referring
13 to this as something written by the governing bodies as
14 opposed to the quality council that makes
15 recommendations to the governing bodies.

16 THE WITNESS: To the statement written by
17 whoever actually wrote it that evidence and studies on
18 the subject of transgender people make clear anything, I
19 disagree.

20 BY ATTORNEY BROOKS:

21 Q. Let me ask you to turn to page six, under the
22 heading question review is recommending it states,
23 quote, as a result of what the review found the guidance
24 concludes that the inclusion of transgender people into

1 female sport cannot be balanced regarding transgender
2 inclusion, fairness and safety in gender affected sport
3 where there is meaningful competition, period, closed
4 quote.

5 Do you see that?

6 A. I do.

7 Q. And do you disagree with that conclusion of this
8 organization or these organizations?

9 A. So I really --- as we discussed earlier, I'm not
10 going to express as an expert --- I don't think I'd be
11 able to express as an expert fairness and so I can't
12 comment any further.

13 Q. Let me ask you to turn to page nine in your
14 expert report, paragraph 49.

15 A. Okay. Paragraph 49.

16 Q. At the end of paragraph 49 you state, quote, a
17 person's genetic makeup and internal and external
18 reproductive anatomy are not useful indicators of
19 athletic performance and have not been used in elite
20 competition for decades. In making that statement when
21 you refer to a person's genetic makeup were you
22 referring to the question of whether they had XX or XY
23 chromosomes?

24 A. So when I'm making the statement genetic makeup

1 I'm heavily referencing chromosomes. So I guess I would
2 say that is mostly correct with some --- with perhaps
3 some known genes, but mostly chromosomes.

4 Q. You would agree, would you not, that respected
5 voices in the field take the view that genetic sex it is
6 at least an important determinant of athletic
7 performance, do you not?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: So that I'm supposed to
10 comment that there are people in the field who say that?
11 I guess what I would say is the consensus right now
12 among medical people advising elite athletic
13 organizations would be to move away from using that as a
14 surrogate. In the past it was. There were chromosome
15 tests and the problem is that people have --- there is
16 quite a bit of variety in biology and of course the
17 moment you make a rule you see the exceptions.

18 BY ATTORNEY BROOKS:

19 Q. The exceptions.

20 A. And so I would say that as an expert I can't
21 comment in terms of, you know, some study of everybody's
22 opinion or some survey. But as somebody who has been on
23 these committees I've observed that that was discarded.

24 Q. So if you put alongside individuals who suffer

1 from any condition that has been identified as a
2 disorder of sexual development, am I correct that you
3 consider yourself to have expertise in what constitutes
4 a disorder of sexual development?

5 A. I have some expertise. And the terminology is
6 actually differences of sexual development or sexual
7 differentiation or intersex are the terms that are more
8 popularly used.

9 Q. You would agree with me, would you not, that
10 many respective sources up to the present would continue
11 to refer to disorders of sexual development?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: So there --- what I would
14 say there is that --- the newer terminology has not ---
15 has not yet permeated because there have not been
16 revisions to all the documents that have been created.

17 BY ATTORNEY BROOKS:

18 Q. How about if we say DSD?

19 A. DSD is a reasonably safe or DSD intersex is what
20 some people do, yes.

21 Q. Well, not all DSDs would be considered intersex
22 conditions.

23 Correct?

24 A. You are right that some people try to parse

1 those two terms even. And there is --- but I think
2 those kinds of distinctions might be on the scope of
3 what we are discussing.

4 Q. Probably so. If we put on side individuals who
5 suffer from anything that is characterized in the field
6 as a DSD you would agree, would you not, that genetic
7 makeup and specifically whether the individual possesses
8 XX or XY chromosomes is a statistically meaningful
9 indicator of athletic performance?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: So no, and the --- it's ---
12 I guess it depends what you mean is what it comes down
13 to. So if you are --- if you are simply saying, well, a
14 certain fraction of people of these chromosomes are
15 going to be --- have this other characteristic, then
16 maybe there are those kinds of associations. But if you
17 are going to say that it's connected to the point where
18 you could actually use one of those let's say observing
19 a chromosome as an actual determination for a given
20 individual, then I would say no.

21 BY ATTORNEY BROOKS:

22 Q. Is it your opinion that a gender identity itself
23 is a --- or useful indicator of athletic performance?

24 A. It is my opinion that gender identity itself is

1 not a useful indicator of athletic performance.

2 Q. You say at paragraph 44 of your report --- I
3 will save that. I think that is a new Declaration and
4 we will not take time to do that.

5 Let me ask you to look at paragraph 24 of your
6 rebuttal report. You say in paragraph 24 that none of
7 Doctor Carlson's arguments support HB-3293 categorical
8 ban of all girls who are transgender from all girls
9 sports teams.

10 Do you see that?

11 A. I do.

12 Q. And I should continue. I'm sorry. Doctor
13 Carlson's safety argument relates solely to contact and
14 collision sports and the physical characteristics
15 developed during puberty, period. By referring to a
16 categorical ban let me ask this. Do you agree that
17 safety considerations could justify or may justify
18 excluding natal males who experienced all or significant
19 part of male typical pubertal development from
20 participating in female division of contact or collision
21 sports such as basketball and soccer?

22 ATTORNEY BLOCK: Objection to form.

23 THE WITNESS: So if the question is would
24 I anticipate as an expert that there would be a safety

1 explanation for banning transgender women from the
2 female category, then I would --- I wouldn't --- I
3 certainly --- let me think about which way to phrase it.
4 I would have a hard time coming up with an example where
5 I would use being transgender as a safety criterion as
6 opposed to body habitus size or some other more
7 objective criterion.

8 BY ATTORNEY BROOKS:

9 Q. Well, and I didn't say anything about gender
10 status. Let me ask again. Would you agree that safety
11 considerations could justify excluding natal males who
12 have experienced all or a significant part of male
13 typical pubertal development from participating in
14 female division contact and collision sports such as
15 basketball or soccer?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: So you're saying that even
18 if we otherwise decided that it would be okay for
19 cisgender males to play with cisgender females, would I
20 envision there being a safety reason to ban those
21 cisgender males?

22 BY ATTORNEY BROOKS:

23 Q. All I asked had nothing to do with gender
24 identity. Do you agree that the introduction onto the

1 field or the court in or have been spoken of its contact
2 or collision sports in the female division of natal
3 males who have gone through all or a significant part of
4 male typical pubertal development could raise legitimate
5 concerns about safety for the natal females?

6 ATTORNEY BLOCK: Same objections as the
7 previous two questions.

8 THE WITNESS: So any person who's gone
9 through a male puberty would that, per se, make me
10 invoke a safety concern, if that's the question ---.

11 BY ATTORNEY BROOKS:

12 Q. Could that in your mind raise the given safety
13 concerns?

14 A. So I would not --- the word legitimate I'm not
15 addressing, but I'm not aware of that in and of itself
16 being a safety concern.

17 Q. You state in paragraph 22 of your rebuttal
18 report that, quote, transgender athletes and women have
19 been competing in NCAA and secondary school athletics
20 for many years at this point. Let me ask you if you are
21 aware of any instance in which natal males have competed
22 in the female category in any contact or collision sport
23 in either the NCAA or high school division?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So can I identify
2 transgender girls or women specifically and specific
3 instances of participation? I cannot.

4 BY ATTORNEY BROOKS:

5 Q. What was your basis for asserting that such
6 athletes have been competing in the NCAA and secondary
7 school athletics for many years?

8 ATTORNEY BLOCK: I'm sorry. Is the
9 question about collision sports? Because you are
10 quoting something that is not about collision sports.

11 ATTORNEY BROOKS: Let me break that out.
12 Thank you.

13 BY ATTORNEY BROOKS:

14 Q. Do you have a view as to whether --- I shouldn't
15 say a view. Do you have any information as to whether
16 transgender athletes have been competing in the women's
17 division of NCAA or secondary school athletics in any
18 contact or collision sports for many years?

19 A. That information on the validity is that they
20 have had access because there has not been a ban.

21 Q. But whether they have done so you do not have
22 any information?

23 A. But I cannot point to specific instances,
24 exactly.

1 Q. I apologize if I asked something early in the
2 morning, but it's faster than trying to dig back into
3 the transcript. Do you have any opinion as to whether
4 it is reasonable to exclude a natal male with a male
5 gender identity from a high school girls basketball
6 team?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: So ask that again a little
9 bit slower.

10 BY ATTORNEY BROOKS:

11 Q. Do you have have any opinion as to whether it is
12 reasonable to exclude a natal male with a male gender
13 identity from participation in a girls high school
14 basketball team?

15 ATTORNEY BLOCK: Objection.

16 THE WITNESS: I do not have an expert
17 opinion on that subject.

18 BY ATTORNEY BROOKS:

19 Q. Do you have a personal view?

20 A. I don't know that I --- there it would get more
21 complicated depending on context.

22 Q. You don't have a simple yes or no personal view
23 on that question?

24 A. I don't.

1 Q. And do you have a view whether it is reasonable
2 to exclude a natal male with a female gender identity
3 from participation in a high school girls basketball
4 team?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: So do I have a view on
7 participation of a cisgender girl in the girls category?
8 Sorry. Say it again.

9 BY ATTORNEY BROOKS:

10 Q. I said do you have a view on whether it is
11 reasonable to exclude a natal male with a female gender
12 identity from participation in the high school girls
13 basketball team?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: So that is a transgender
16 girl, got it. So --- and the question is do I have a
17 view on --- I apologize. Go back.

18 BY ATTORNEY BROOKS:

19 Q. I can do it again.

20 A. Yes, do it again. Sorry.

21 Q. Do you have a view as to whether it is
22 reasonable to exclude a natal male with a transgender
23 identity from participation in the girls high school
24 basketball team?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: And it is do I have a view
3 on excluding --- as an expert am I opining on that? I'm
4 not. I'm opining as a scientist on what the data are.

5 BY ATTORNEY BROOKS:

6 Q. Do you consider a policy that excludes natal
7 males with a male gender identity from the girls
8 basketball team to be, quote, discriminatory?

9 ATTORNEY BLOCK: Objection to form and
10 scope.

11 THE WITNESS: So as an expert I'm not
12 taking a position on excluding cisgender males from the
13 female category, if I answered that correctly.

14 BY ATTORNEY BROOKS:

15 Q. My question was simply do you consider such a
16 policy to be a discriminatory policy?

17 ATTORNEY BLOCK: Objection to form and
18 scope.

19 THE WITNESS: So are you asking me as an
20 expert to define discrimination?

21 BY ATTORNEY BROOKS:

22 Q. I will direct you to paragraph 27 of your
23 rebuttal report. And there you wrote Doctor Carlson has
24 not offered cogent explanation for why alleged safety

1 concerns based on average differences in size and
2 strength should be addressed within an across the board
3 exclusion of transgender women as opposed to tailored
4 nondiscriminatory policies.

5 Do you see that?

6 A. I do.

7 Q. So understanding discriminatory, however you did
8 understand it when you wrote that, do you consider a
9 policy that prohibits natal males with a male gender
10 identity from participating on the girls basketball team
11 to be a discriminatory policy?

12 ATTORNEY BLOCK: Same objections.

13 THE WITNESS: Right. So I'm not defining
14 --- I'm not defining discriminatory here. I'm ---
15 right. So if you are asking as an expert to define
16 discriminatory, that I can't do.

17 BY ATTORNEY BROOKS:

18 Q. Well, if you don't know what discriminatory
19 means, what do you mean when you referred to a tailored
20 nondiscriminatory policy?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: I guess I have to circle
23 back initially to --- I mean we can do that for any word
24 here, right, where I could have like my own personal

1 definition or am I acting as an expert to define these
2 words, and I think we are kind of in that situation.

3 BY ATTORNEY BROOKS:

4 Q. But I'm asking you about your expert reports in
5 the litigation. You must have meant something. What
6 did you mean by nondiscriminatory when you submitted
7 this expert report?

8 ATTORNEY BLOCK: Objection to form.

9 THE WITNESS: So when I'm using the word
10 nondiscriminatory I am using it to mean something that
11 isn't using some other indicator --- well, I'm really
12 just using it in the broadest sense to something that is
13 including people.

14 BY ATTORNEY BROOKS:

15 Q. Using it in the broadest sense, discriminating
16 between one category and another is --- could be a good
17 thing or a bad thing.

18 Correct?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: As an expert I --- that is
21 way outside my scope. But simply as an English speaker,
22 yes, discrimination could be good or it can be bad, yes.

23 BY ATTORNEY BROOKS:

24 Q. And for instance, if you are --- well, you said

1 you don't prescribe to minors, so --- but if you are
2 dealing with a 19-year-old who says and you concluded I
3 need gender affirming hormone, and I will use the term
4 you prefer, if that individual's hormones and biology
5 are female then gender affirming hormones are going to
6 consist, among other things, perhaps of administering
7 testosterone.

8 Correct?

9 A. Yes, typically we would have have ---.

10 Q. And if that individual's biology and hormones
11 endogenous were male, then the gender affirming hormones
12 would include among other things estrogen or estrogen
13 analog.

14 Correct?

15 ATTORNEY BLOCK: Objection to form.

16 THE WITNESS: If that person had
17 typically --- typically a male hormone profile, right,
18 to move toward a more feminine profile that typically
19 would include estrogens or some other agents that were
20 other than testosterone, yes.

21 BY ATTORNEY BROOKS:

22 Q. So speaking scientifically and not in civil
23 rights terms, if I may, you as a scientist, as you
24 decide which regimen of hormones to administer to this

1 individual have to discriminate between those who are
2 endogenously male and those who are endogenously female
3 in deciding which regimen you prescribe.

4 Correct?

5 ATTORNEY BLOCK: Objection to the form.

6 THE WITNESS: We have to make a decision.

7 And so if you are trying to get me to say that
8 discrimination can be defined as making decisions, I'm
9 with you and yes.

10 BY ATTORNEY BROOKS:

11 Q. Okay.

12 Let me just run down a few items to make sure.
13 You have not personally engaged in any research
14 regarding sports physiology, have you?

15 A. I'm trying to think if there's anything. I
16 don't believe I have.

17 Q. You yourself haven't personally engaged in any
18 research or published any papers --- that's a compound
19 question. You, yourself, haven't engaged in any
20 research relating to sports medicine or sports injuries,
21 have you?

22 A. I have not engaged in any research with regard
23 to sports injuries. And the answer to the first part of
24 that gets a little muddled because some of the papers

1 that I have written about physiology and transgender
2 people could apply to sports medicine.

3 Q. Have you, yourself, ever participated in
4 devising any athletic training regimes for individuals
5 of either sex?

6 A. I've not been involved in devising any training
7 regimes.

8 Q. Have you done any research with related to male
9 physiology --- I'm sorry, male physiological advantages
10 relevant to athletics before, during or after puberty?

11 A. So there I have --- none of the research that I
12 have done to date has been specifically loopholed as ---
13 well, I can't even say that. So research that I have
14 done with regard to observing physiology among my
15 subjects can be applicable to sports medicine in some
16 context.

17 Q. On what publications, if any, of yours do you
18 believe relate to male physiological advantages in
19 athletics before, during or after puberty?

20 A. Well, just off the top of my head, without
21 looking at it exhaustively, I have a paper on
22 hematocrit, which is the oxygen-carrying cells in
23 people. In transgender people I have a paper on
24 testosterone levels with different treatments. So those

1 can have --- those actually can have a sports context.

2 Q. Have you done any research on the impact of
3 testosterone suppression on athletic performance or any
4 measurement of strength?

5 A. So the second piece of that is I have not done
6 any research that specifically used strength as an
7 endpoint in my own studies. To the second piece of
8 those --- I forgot what ---.

9 Q. Athletic performance?

10 A. Athletic performance, there it gets a muddled
11 thing. The research that I have done can be applicable
12 in that context.

13 Q. Well, that is if your endpoint is hematocrit
14 count, to use the right term, you're saying that might
15 have implications for athletic performance? Is that
16 your point?

17 A. That is correct, yes.

18 Q. But you have not done any research in which any
19 measurement of athletic performance is an endpoint?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: Again, I have to think
22 about how to say that because some of the --- part of
23 the problem is that papers that we're looking at include
24 quite a bit of literature on components that may be

1 applicable --- that may be applicable in sports
2 medicine, whether it is muscle strength and muscle size
3 or blood cell counts and such. And so that more
4 expansively than my research is in that category.

5 Whereas, if I'm trying to be focused and narrow, then
6 I've got those two studies, the one by Roberts and the
7 one by Harper. And my papers are not those.

8 BY ATTORNEY BROOKS:

9 Q. You don't have any information about numbers of
10 children in West Virginia who suffer from any DSD, do
11 you?

12 A. No, as --- I guess I have to say no there in
13 terms of actual surveys of kids in West Virginia, I know
14 some brought statistics. West Virginia is big enough
15 that you would predict that the statistics would
16 generally apply, but that is as smart as I could get on
17 the subject.

18 Q. And you are --- I think you effectively answered
19 this, but to be clear for the record you are not opining
20 that BPJ suffers from any DSD?

21 ATTORNEY BLOCK: Objection to the form.

22 THE WITNESS: So the --- here too we get
23 into --- into an evolving area of definitions where you
24 could envision if some of the specific genetics that are

1 associated with being transgender became identified,
2 would we in the medical world start to label those
3 instances as DSD? It's possible. So that is just ---.

4 BY ATTORNEY BROOKS:

5 Q. Thus far no such indicators have been
6 identified.

7 Correct?

8 A. I can't even --- I can't even say that
9 definitively. It is an area of active conversation in
10 terms of --- in terms of boarder setting in the medical
11 community right now.

12 Q. However, I think my question is easier. You're
13 not offering an opinion --- any opinion that BPJ suffers
14 from any DSD, are you?

15 A. So I don't have --- so to be clear first I don't
16 know the --- BPJ's specific medical condition. I wasn't
17 brought in to evaluate that and I have not. So I can't
18 actually render an opinion on any of the medical story
19 there.

20 Q. And you don't know whether any child or typical
21 XY chromosome --- pardon me, you don't know whether any
22 child with XY chromosomes who suffers from a DSD has
23 ever sought to compete in female athletics in West
24 Virginia up until the present?

1 ATTORNEY BLOCK: Objection to the form.

2 THE WITNESS: So the question is do I
3 know of an instance of a specific individual with XY
4 chromosomes and a DSD connected to that who has
5 specifically participated in sports in West Virginia?

6 BY ATTORNEY BROOKS:

7 Q. Who has sought to participate in female
8 athletics in West Virginia?

9 A. Right, so who has sought to participate in
10 female sports in West Virginia. I cannot give you a
11 specific instance, that is true. I can say, though,
12 knowing the percentage of people who have DSDs and the
13 size of the State of West Virginia that you would
14 predict it would be true, but that would be again as
15 smart as I could be on one subject.

16 ATTORNEY BROOKS: Let me mark as Safer
17 Exhibit 15 what was previously designated as Tab 53, an
18 article by Dr. Safer and others entitled the Mount Sinai
19 Patient Center Preoperative Criteria Meant to Optimize
20 Outcomes are Less of a Barrier to Care than WPATH SOC 7
21 Criteria Before Transgender Specific Surgery. And yes,
22 that is a mouthful.

23 ---

24 (Whereupon, Exhibit 15, Dr. Safer Article,

1 was marked for identification.)

2 ---

3 BY ATTORNEY BROOKS:

4 Q. Now, Dr. Safer, to be fair, I see that you are
5 the last listed author on a fairly lengthy list of
6 authors. And maybe that does and maybe that doesn't
7 have significance in terms of how in depth your
8 involvement in this paper was. Let me ask. Was this a
9 paper of which you had some significant input?

10 A. I had significant input. I can tell you that in
11 the medical and scientific community the first author
12 typically did the work and the last author is the senior
13 author and supervisor. And the middle authors are
14 actually the ones where you ---.

15 Q. Okay.

16 I was aware of the significance of the first.
17 I was not aware of the significance of the last. Okay.
18 That is helpful. All of the authors here, if I'm
19 correct, are colleagues within the Mount Sinai Clinic or
20 division that you supervise.

21 Am I correct?

22 A. All of the authors were in those positions at
23 some point, which is how we came together to write the
24 paper.

1 Q. And the paper I should say for the record is
2 dated 2020. And let me see if I correctly understood
3 what the paper is about. If we --- in this paper you
4 compare the eligibility of patients who are seeking
5 vaginoplasty under the WPATH Standard of Care 7 criteria
6 versus the criteria actually used by your clinic.

7 Am I correct?

8 A. Yes.

9 Q. And just so we're clear, vaginoplasty is a
10 surgery that is only done on biological male, natal male
11 individuals.

12 Correct?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: So a vaginal plasty is the
15 genital reconstruction surgery to create a vagina in a
16 person. When we are using it as a gender affirming
17 surgery, then we are using it on people who have what
18 would be considered typically male anatomy in that
19 circumstance but the surgery could also be used on
20 somebody with typically female anatomy requiring
21 construction for whatever their circumstance may be.

22 BY ATTORNEY BROOKS:

23 Q. That said, the subjects discussed in this paper
24 are all individuals who are seeking the surgery for

1 gender affirming purposes rather than, for instance,
2 because of a severe DSD.

3 Correct?

4 A. The people in this circumstance are all people
5 seeking the surgery for gender affirming purposes and
6 not those for DSD or for other purposes, reconstruction
7 of vaginas for accidents and cancers. I mean there is
8 quite a range.

9 Q. And the result as summarized in the abstract is
10 that of 139 patients who were identified as subjects of
11 this study, 63 qualified for surgery immediately based
12 on the Mount Sinai criteria.

13 Correct?

14 A. Yes.

15 Q. Whereas only 21 of those would have qualified
16 based on the criteria set out in the WPATH Standard of
17 Care Version 7?

18 A. Yes.

19 Q. Three times as many individuals qualified for
20 immediate surgery under the standard used by your clinic
21 as opposed to the standards set out in the WPATH
22 Standard of Care?

23 A. That's correct.

24 Q. When did your clinic begin approving surgery for

1 patients who are not eligible under the WPATH Standard
2 of Care?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: Yeah, so to be clear, the
5 patients in our program qualify by both criteria. The
6 paper is simply pointing out that our process is more
7 efficient and patient friendly, but it's not to say that
8 we were not informed by WPATH criteria also. And I
9 think I need to expand even a little bit further. Part
10 of the point of the paper is that it includes --- it
11 includes efforts to know benefit to the patient that end
12 up being time consuming and therefore are a waste of
13 energy in contrast to our approach, which is actually
14 more conservative than WPATH's approach. We actually
15 look at more things but we do so in a more efficient
16 fashion and that is actually the point of the paper.

17 BY ATTORNEY BROOKS:

18 Q. Well, let me clarify one thing you just said.
19 According to this paper, it is not the case, is it, that
20 every patient for whom your clinic approved surgery was
21 at that time qualified according to the WPATH criteria?

22 ATTORNEY BLOCK: Objection to form.

23 THE WITNESS: Wait. Say it again. Could
24 you repeat that?

1 BY ATTORNEY BROOKS:

2 Q. It is not the case, is it, that every patient
3 who was qualified for surgery by your clinic had been
4 demonstrated to satisfy the WPATH criteria for
5 eligibility?

6 A. It is --- so there were --- the patients just as
7 stated who qualified by our criteria but not by WPATH
8 criteria, there is such a group that existed, exactly,
9 yes.

10 Q. Okay.

11 And specifically, according to your criteria,
12 three times as many patients are eligible according to
13 WPATH criteria?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: It's not so much the three
16 times. It is the pace. Some of this relates to pace
17 and efficiency.

18 BY ATTORNEY BROOKS:

19 Q. Dr. Safer, your clinic, according to this paper,
20 approved for surgery 42 patients who were at that time
21 not eligible according to WPATH criteria.

22 Correct?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: No. So the reality is we

1 still live in the universe that everybody else lives in,
2 so we are --- so this paper proposes a more appropriate
3 and a more patient appropriate model, but it is not the
4 case that we actually sent people to surgery who would
5 not be approved by WPATH.

6 BY ATTORNEY BROOKS:

7 Q. Well, were you personally involved in developing
8 and approving Mount Sinai's criteria?

9 A. Let me look at the role here. Yes, I definitely
10 had a role in developing our criteria.

11 Q. Let me ask you to look at page 168, column one,
12 call your attention quite a bit to table one. And if I
13 understand correctly, table one is designed to help us
14 compare and contrast what is required by the WPATH
15 criteria for surgical readiness versus the Mount Sinai
16 criteria for surgical readiness.

17 Correct?

18 A. That is correct, yes.

19 Q. And the WPATH requires a letter of support from
20 the patient's hormone provider confirming the hormone
21 regimen and the length of time of hormone therapy.

22 Correct?

23 A. That is how it is written, yes.

24 Q. And farther down, under mental health it says

1 that it requires two letters of support from mental
2 health providers?

3 A. It does, yes.

4 Q. And it gives on page 157 a definition who is a
5 qualified mental health professional down towards the
6 bottom of the second column. I'm going to ask you to
7 find that language if you could?

8 A. Uh-huh (yes), yes.

9 Q. You say, many define licensed mental health
10 providers having one or more of the following
11 credentials, the LCSW, Licensed Clinical Social Worker.

12 Is that right?

13 A. LCSW is Licensed Clinical Social Worker, yes.

14 Q. And MD, DO that is a medical doctor, a doctor of
15 --- what does the O stand for?

16 A. Osteopathy.

17 Q. There we go. A psychiatrist, a Ph.D., yes, that
18 was surprising to me. Surely not just any Ph.D.?

19 A. Right, that's referring to a Ph.D. clinical
20 psychologist.

21 Q. Okay.

22 Or any Master's level for above counseling
23 degrees. But then you go on to say that in your
24 evaluation based on SOC-7 criteria. That's the WPATH

1 criteria?

2 A. That's the WPATH criteria, yes.

3 Q. We included the above degrees with the following
4 exclusions, mental health providers with lower than
5 Master's level training and unlicensed mental health
6 providers of any type, NPs and PAs without mental health
7 credentials, physicians who are not psychiatrists or
8 mental health providers who are still in training. Do
9 you see that language?

10 A. I do.

11 Q. So under the definition used in your clinic you,
12 yourself, do not qualify as a mental health
13 professional.

14 Correct?

15 A. That is correct.

16 Q. So at no point have you relied on your own
17 opinion for any mental health evaluation for
18 eligibility?

19 A. That's correct.

20 Q. Okay.

21 I just wanted to understand that clearly. So
22 back to mental health data. It says in the WPATH column
23 that two letters of support from mental health providers
24 are required. In this paper you state on the next page,

1 but I will quote it the most significant of the Mount
2 Sinai criteria is the removal of the requirement of two
3 independent psychiatric evaluations. And that is in
4 column two of page 169, at the end of the first full
5 paragraph. The first full paragraph, column two, the
6 final sentence.

7 A. I'm in which column? Sorry.

8 Q. Column two.

9 A. Oh, column two. Sorry.

10 Q. The first full paragraph, final sentence.

11 A. The most significant deletion from the Mount
12 Sinai criteria is the removal of --- yes, I see that.

13 Q. And you stated at the top of column one on the
14 same page that, quote, finding two mental health
15 providers to do independent evaluations is
16 time-consuming, expensive and difficult.

17 Right?

18 A. Just trying to find that exact wording. Yes.

19 Q. So in your own clinic's practice, while WPATH
20 calls for two letters from independent mental health
21 providers, you concluded that because it was hard to get
22 two independent evaluations your clinic would simply
23 dispense with the requirement of any independent mental
24 health review.

1 Correct?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: No, that is not quite
4 correct. Part of the difference for our operation is
5 that we have --- we have expertise in-house and we have
6 --- if you notice, looking at the table, a longer list
7 of requirements actually than WPATH does, which includes
8 a social work component. And that actually is the ---
9 that's the source of actually yet a second pair of eyes,
10 as it were. And so it is not the case that we are ---
11 that we're providing less of a screen, we are actually
12 providing more of a screen. It's just that we are
13 operating in a more efficient manner for the patient.

14 BY ATTORNEY BROOKS:

15 Q. Let's flip back to column one. A few more lines
16 down it says for our analysis patients who otherwise met
17 WPATH SOC 7 criteria received one letter of support from
18 the CTMS mental health provider. Right? You would
19 agree with me, would you not, that the only letter of
20 support for a mental health provider required by your
21 protocols is from a mental health provider within your
22 employment?

23 ATTORNEY BLOCK: Objection to not reading
24 the complete sentence.

1 THE WITNESS: So yes. So maybe let me
2 just --- show me the wording again.

3 BY ATTORNEY BROOKS:

4 Q. Yes. For our analysis --- and I'm beginning at
5 perhaps eight lines down.

6 A. Our analysis, yes.

7 Q. Patients who otherwise met WPATH SOC 7 criteria
8 received one letter of support from the CTMS mental
9 health provider doing the assessment, period, closed
10 quoted.

11 Do you see that?

12 A. I do, yes.

13 Q. As the term is generally understood in your
14 field, a CTMS mental health provider is not independent
15 --- let me use the correct terminology, is not an
16 independent mental health provider?

17 A. So in a clinic setting I don't know that the
18 word independent actually has the same meaning as in
19 some other context. So even a WPATH requirement isn't
20 necessarily that it would be an unaffiliated person or I
21 don't know what you were thinking independent might mean
22 here, so I don't want to put words in your mouth or
23 conjecture too much. But when we say independent we
24 just mean two different people.

1 Q. But in fact, the letter of support from the CTMS
2 mental health provider that you refer to in this
3 paragraph at the top of column one of page 169 actually
4 plays no role in your determination as to whether this
5 patient is eligible for surgery.

6 Correct?

7 ATTORNEY BLOCK: Objection to form.

8 THE WITNESS: So yes. I'm confused by
9 the question.

10 BY ATTORNEY BROOKS:

11 Q. I'm confused by the text. The final paragraph
12 --- sentence in that paragraph reads these letters of
13 support were used to satisfy third payor requirements to
14 cover surgery and were not part of the CTMS assessment?

15 A. Oh, yeah, that's a good point. The literal
16 letter is because we are all in-house the opinion of the
17 person is, of course, important and so the screen takes
18 place. But the need to create --- the bureaucratic of
19 creating a specific letter is one of the burdens that we
20 are suggesting could be removed.

21 Q. In table one, let me find this. Under mental
22 health WPATH SOC-7 requires, quote, persistent, well
23 documented gender dysphoria.

24 Do you see that?

1 A. I do.

2 Q. And you understand well documented gender
3 dysphoria to be referring to a general diagnosis under
4 the DSM-V criteria?

5 A. So for WPATH's purposes I think they are
6 specifically referring to the DSM diagnosis.

7 Q. In your clinic you are willing to approve for
8 this --- I'm not sure how to actually say the word
9 vaginoplasty surgery, individuals who do not suffer from
10 persistent well documented gender dysphoria.

11 Correct?

12 ATTORNEY BLOCK: Objection to the form.

13 THE WITNESS: So if you look, the list of
14 the criteria for Mount Sinai, then the phrasing is a
15 confirmation that this person --- for all intents and
16 purposes, that this person is transgender and with the
17 language and evolution we use that word gender dysphoria
18 and we also use the new word that will replace gender
19 dysphoria, gender incongruence, as the terms I
20 referenced before, transgender.

21 BY ATTORNEY BROOKS:

22 Q. And the effect of that is you do not require a
23 diagnosis of gender dysphoria under the terms of DSM-V.

24 Correct?

1 ATTORNEY BLOCK: Objection to form.

2 THE WITNESS: So the --- yeah, if we had
3 our druthers, which is I think you are asking, and we
4 did not --- and we weren't simply satisfying a third
5 party payor, would we insist on that formal DSM-V
6 criteria for a person we otherwise know to be
7 transgender? We would not.

8 BY ATTORNEY BROOKS:

9 Q. And in fact, you do not.

10 Correct?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: Well, as a practical
13 matter, like I said, we live in a universe where we end
14 up doing both what we suggest is the necessary approach
15 and we end up, because we still live in the universe
16 that we live in, satisfying the other approach even
17 though we're suggesting that it's cumbersome.

18 BY ATTORNEY BROOKS:

19 Q. Dr. Safer, you testified earlier that, in fact,
20 in 42 patients your clinic determined they were surgery
21 eligible even though they did not satisfy the SOC
22 criteria listed in column one of table one?

23 A. Right. So they are not --- so they would be ---
24 they theoretically would be eligible without having

1 satisfied the --- some of those specific WPATH criteria
2 that we discussed. But in practice nobody went to
3 surgery without covering both sets of criteria.

4 Q. Isn't the precise results reported by this paper
5 that 42 patients were deemed surgery approved who did
6 not qualify under WPATH criteria?

7 A. But I guess the bottom line of the paper is that
8 if we followed our --- our rules alone, we would
9 actually cover more details and be more conservative in
10 our approach if a longer list of criteria and we would
11 do so more quickly. That's all the paper says. It
12 doesn't say that we have --- that we have actively
13 defied the existing universe and sent people to surgery
14 without covering the criteria that are generally being
15 used by doctors.

16 Q. And by the way, the surgery we're talking about,
17 vaginoplasty, in the context where it is being used for
18 gender affirming purposes, invariably includes
19 castrating the individual.

20 Correct?

21 ATTORNEY BLOCK: Objection to form and
22 foundation.

23 THE WITNESS: So a vaginoplasty is a
24 genital reconstruction surgery, which in this context is

1 taking the existing typically --- typical male genitalia
2 and reconfiguring it into typically female genitalia.

3 And in that --- in the procedure the testes are removed.

4 BY ATTORNEY BROOKS:

5 Q. They're not reconfigured?

6 A. They are not reconfigured.

7 Q. Let me ask you 169, column one, it says about
8 two-thirds of the way down, at the end of the paragraph
9 that begins medical requirements for the Mount Sinai
10 CTMS? I want to direct your opinion --- your attention
11 to the final sentence.

12 A. So which paragraph, column one.

13 Q. Column one, the paragraph that begins halfway
14 down, medical requirements?

15 A. Yes.

16 Q. Now, let's jump to the end. The Mount Sinai
17 criteria also removed the 12-month continuous hormone
18 therapy requirement for the vaginoplasty which
19 complicates matters for people who have received hormone
20 therapy from non-medical providers.

21 Do you see that language?

22 A. I do.

23 Q. Explain to me the reference for people who have
24 received hormone therapy from non-medical providers?

1 A. Well, it is the circumstance that some people
2 more so outside of New York, some transgender people
3 still do not have access to care for --- to gender
4 affirming care and do get some of their treatment by
5 alternative means. And if there is an insistence on a
6 documented 12-month continuous hormone therapy
7 requirement, then those people might not be able to be
8 approved for surgery.

9 Q. I need to ask you to clarify what you mean by
10 obtaining by alternate means?

11 A. We have people getting hormones from internet
12 providers. We have people inappropriate --- well, I
13 apologize, I don't want to make a value judgment there,
14 but we have people getting hormones from friends or
15 connections of theirs, things outside the system.

16 Q. So you have some people come to you who have
17 effectively self-diagnosed and self-prescribed ---

18 ATTORNEY BLOCK: Objection.

19 BY ATTORNEY BROOKS:

20 Q. --- hormone therapies?

21 ATTORNEY BLOCK: Objection to form.

22 THE WITNESS: So when we are seeing
23 people for surgeries, then it is no longer a matter of
24 self-diagnosis because we see them ourselves with our

1 internal team. But there are people who have
2 self-prescribed their hormones or obtained them by
3 nonconventional means, that part, yes.

4 BY ATTORNEY BROOKS:

5 Q. And when people come in who have obtained
6 hormones by nonconventional means and taken them without
7 prescription necessarily, you chose to remove the
8 requirement for 12 months properly prescribed continuous
9 hormone therapy rather than insisting that the patients
10 undergo control of hormone therapy for 12 months before
11 you operate on them?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: So to clarify, again, these
14 are --- we are proposing that this would be the
15 protocol. In practice, we have not been able to do
16 this, that is we have had to do both. But in our
17 experience, as a program we don't see any benefit to a
18 supervised --- a supervised regimen, that is we are not
19 --- I'll just leave it there.

20 BY ATTORNEY BROOKS:

21 Q. WPATH in table one requires that all psychiatric
22 symptoms be, quote, well controlled.

23 Correct?

24 A. They use that language, yes.

1 Q. And the language under the CTMS column is rather
2 different. Among other things it says no suicide
3 attempt in the last six months. Do you see that?

4 A. Let me find it. We're in the table, right?

5 Q. We are in the mental health section under CTMS
6 column?

7 A. Yes.

8 Q. No suicide attempt in the last six months. But
9 if the patient tried to commit suicide seven months ago,
10 that's okay?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: So the point here and the
13 distinction is that the WPATH criteria are too vague,
14 and so what you are observing with the Mount Sinai
15 criteria is they're much more granular. And rather than
16 leaving something to some subjective interpretation we
17 define some of the specifics to make it clearer on what
18 the guidelines should be.

19 BY ATTORNEY BROOKS:

20 Q. You refer here in your guideline to no suicide
21 attempt in the last six months. If a patient has
22 entertained suicidal thoughts but made no attempt in the
23 last six months, did that patient potentially satisfy
24 the Mount Sinai criteria?

1 A. So that kind of decision would be at the
2 discretion of the reviewing mental health professional,
3 the psychiatrist or the psychologist, and so you can
4 certainly envision different circumstances. So even
5 going back to your example of seven months, you could
6 envision that something like that might be considered,
7 depending upon the person, too unstable even though they
8 technically met criteria. This isn't just a check box.
9 It is more a guideline. And similarly, to your point
10 about a suicidal ideation, there are different tiers of
11 them. And I won't claim to be an expert on the
12 specifics there, but my mental health professionals are
13 more concerned about some of those than others.

14 ATTORNEY BROOKS: Take a break.

15 VIDEOGRAPHER: The current time reads
16 3:35 p.m. Eastern Standard Time.

17 OFF VIDEOTAPE

18 - - -

19 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

20 - - -

21 ON VIDEOTAPE

22 VIDEOGRAPHER: We are back on the record.
23 The current time is 3:55 p.m. Eastern Standard Time.

24 BY ATTORNEY BROOKS:

1 Q. Dr. Safer, you testified earlier, and I think
2 I'm using the word that you used that if your clinic had
3 its druthers they would be following or making decisions
4 strictly based on the criteria that are laid out in this
5 paper, Exhibit 15, under the heading of Mount Sinai
6 CTMS.

7 Correct?

8 A. Yes.

9 Q. And can I infer from that that you, yourself,
10 don't view the WPATH SOC-7 as setting out scientifically
11 established best practices but rather recommendations on
12 which you use different?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: No, I would not say that.

15 So SOC-7 sets out the guidelines as things were
16 understood in 2011 and 2012, and we have learned ---
17 we've learned and things have evolved since then in
18 terms of the care of transgender people.

19 BY ATTORNEY BROOKS:

20 Q. Did you have any participation in the
21 development of the SOC-7 guidelines?

22 A. I had very minimal participation. I helped
23 review some articles that informed those guidelines.

24 Q. Those guidelines --- did you have any

1 familiarity with the process of how they were being
2 drafted?

3 A. I'm trying to think if I can say things
4 usefully. I was not close enough to the process that we
5 would want --- that I would want to start commenting on.

6 Q. Do you know whether they addressed issues on
7 which opinions within the drafting committee differed?

8 A. I can't comment on SOC-7. We are literally
9 writing SOC-8 now.

10 Q. And on that are there issues that the SOC-8 is
11 addressing on which opinions significantly differ?

12 A. Yes.

13 Q. So it's not that every aspect of the guidelines
14 are unanimously agreed by every member?

15 ATTORNEY BLOCK: Objection to form.

16 THE WITNESS: So with medical guidelines
17 in general there isn't --- that unanimity wouldn't be a
18 thing. They're referred to as consensus documents
19 rather than unanimous documents.

20 BY ATTORNEY BROOKS:

21 Q. And what that tells us is that there is --- that
22 reasonable people differ on at least some aspects of
23 what is set forth in the document?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: In all guidelines,
2 including these, members of the committee even differ in
3 terms of how things are framed and when consensus is
4 obtained, but not unanimity.

5 BY ATTORNEY BROOKS:

6 Q. How many gender performing surgeries or gender
7 affirming surgeries were performed in your clinic in
8 2021?

9 A. In 2021, all --- there were, according to the
10 New York Times, about 9,000 total surgeries performed at
11 Mount Sinai hospitals, including everything we do. So
12 that wouldn't just be vaginoplasty. That would include
13 chest reconstruction surgeries, revisions of older
14 surgeries, et cetera.

15 Q. Well, you quote the New York Times. Where did
16 they get the information?

17 A. I suppose the sources is us.

18 Q. You believe that number to be approximately
19 accurate?

20 A. I think that's right.

21 Q. I don't trust the New York Times, but you have a
22 pass. And now 2021 may or may not have been affected by
23 COVID in terms of patients presenting and wanting
24 surgery. Has there been a clear trend in numbers of

1 surgeries performed by your clinic over the last five
2 years?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: So there is definitely an
5 increase in the number of surgeries at Mount Sinai over
6 the past five years. Unfortunately, expectation is the
7 challenge. We opened the program in 2016, so roughly
8 those five years. And certainly the first few years
9 were quieter as the reputation grew. In 2020, numbers
10 were down because we had to divert resources to taking
11 care of people with COVID. Our group, including myself,
12 literally dropped what we were doing for a period of
13 time to go become COVID hospital employees, and so there
14 was a dip there in 2021 as a little bit of a rebound
15 element to it.

16 BY ATTORNEY BROOKS:

17 Q. Are you able to give me any average total
18 receipts of your clinic or the hospital as a whole and
19 associated physicians from gender affirming surgeries
20 performed within 2021?

21 A. I'm sorry, say that again.

22 Q. Let me just ask this again. Do you have any
23 knowledge as the total --- as to the total receipts of
24 your clinic or the wider hospital and physicians

1 involved as a result of gender affirming surgeries
2 performed by your clinic in the last year?

3 A. So do I know some of the financial elements?

4 Q. Correct.

5 A. So I do know some of the financial elements, but
6 nothing that the hospital would allow me to share.

7 Q. Your counsel can designate it as confidential
8 later on, so it doesn't become public, but you are
9 obliged to answer the question.

10 ATTORNEY BLOCK: I'm not ---.

11 BY ATTORNEY BROOKS:

12 Q. I'm entitled to understand your financial
13 interest in the area of your testimony.

14 ATTORNEY BLOCK: We are not representing
15 him in the context of any legal dispute with Mount
16 Sinai.

17 ATTORNEY BROOKS: I am entitled to
18 understand the expert's financial interest. And I
19 suggest to you, Counsel, that you'd rather have me
20 questions asked here where you can designate it as
21 confidential than at trial in a public courtroom.

22 ATTORNEY BLOCK: It's not up to me.

23 ATTORNEY BROOKS: You can confer if you
24 want, because that would be the alternative. If you

1 want to step out and confer with your witness, you
2 should do so.

3 ATTORNEY BLOCK: It's not up to me to say
4 what he can and can't say in contravention with an
5 agreement with his employer, and so I think if you want
6 to like obtain like a Protective Order, you know, with
7 him.

8 ATTORNEY BROOKS: We have a Protective
9 Order in place, Counsel.

10 ATTORNEY BLOCK: I know, I'm not
11 representing him in that capacity, though. So if you
12 want to interface with his attorney through Mount Sinai
13 then you can, but I don't have an attorney/client
14 relationship with him for purposes of any employment
15 disputes.

16 ATTORNEY BROOKS: Are you instructing the
17 witness not to answer?

18 ATTORNEY BLOCK: No, I'm not.

19 ATTORNEY BROOKS: Are you refusing to
20 answer?

21 THE WITNESS: I wouldn't be able to
22 answer without including the hospital lawyers.

23 BY ATTORNEY BROOKS:

24 Q. Can you tell me ---?

1 ATTORNEY TRYON: This is Dave Tryon. I'm
2 sorry ---.

3 ATTORNEY BROOKS: Go ahead.

4 ATTORNEY TRYON: May I just also say that
5 I think if the witness is not willing to disclose his
6 financial interest here, that that would be grounds to
7 disqualify him as a witness, which on behalf of the
8 state I would likely pursue. So I would respectfully
9 request that he answer the question.

10 ATTORNEY BLOCK: Dave, on what basis is
11 that grounds to --- he has disclosed everything required
12 by the rules. You're asking for --- he has no financial
13 interest in this litigation.

14 ATTORNEY BROOKS: We don't need to argue
15 the motion right now. The motion seems likely, the
16 motion will be briefed, but we don't --- we got no Judge
17 here, we're not going to be deciding ---.

18 ATTORNEY BLOCK: If you want to file a
19 subpoena as a third-party subpoena for that information
20 with a Court Order, than you're free to do so. He is
21 appearing here as an expert witness on his expert
22 testimony. So you have plenty of discovery tools to
23 obtain that information. And we're not his counsel for
24 that.

1 ATTORNEY BROOKS: I do have discovery
2 tools, including asking him questions at this
3 deposition. I've attempted to do so. You have not
4 instructed him not to answer. The witness has refused
5 to answer. The record is clear.

6 BY ATTORNEY BROOKS:

7 Q. Let me ask you about personally. Does your own
8 income or any bonus you receive depend on any part of
9 the overall revenues of your plan?

10 A. It does not.

11 Q. And does your personal income consist strictly
12 of a salary or also a salary plus fees associated with
13 surgeries performed?

14 A. Exclusively a salary.

15 Q. And your income depends in no way on how many
16 surgeries, you yourself perform?

17 A. That --- well, I don't perform surgeries I'm not
18 an endocrinologist.

19 Q. Pardon me.

20 A. But that's right, it's not revenue based.

21 Q. It's not revenue based in any way?

22 A. In any way. That's right.

23 Q. That is helpful. Do you have any understanding
24 as to the average revenues per patient that your clinic

1 receives for patients who are seeking gender affirming
2 surgery in the clinic?

3 A. We don't characterize it that way. There's a
4 --- there's a wide range of reimbursements or lack of
5 reimbursements across medicine. And gender affirming
6 care includes quite that entire range actually, from
7 mental health, which is under reimbursed, to the
8 surgeries which are --- where there's more money.

9 Q. I've been waiting to hear the flip side of that.

10 A. So yes, so we have that, so I don't think I
11 could give --- I wouldn't --- even were I allowed by the
12 hospital to give you the specifics, I don't know that I
13 would be able to do that on a per patient basis.

14 Q. Can you tell me your total personal income in
15 2021 from --- in any way related to your work in
16 connection with your employment at Mount Sinai?

17 A. So is this something that I'm answering?

18 ATTORNEY BLOCK: I'm sorry, could you
19 restate the question?

20 THE WITNESS: He's asking for my ---
21 you're asking for my salary?

22 BY ATTORNEY BROOKS:

23 Q. I'm asking for your total income, in any way
24 --- in 2021 in any way associated with the clinic at

1 Mount Sinai?

2 A. So we're running into --- so I'm simply on
3 salary, but the specifics of that are also something
4 where I would need to include the Mount Sinai lawyers,
5 because that's part of their practice, and I would have
6 to defer to them.

7 Q. You decline to answer the question about your
8 own personal income?

9 A. Yes.

10 ATTORNEY BROOKS: I won't take time to
11 speak upon it, but I will object.

12 BY ATTORNEY BROOKS:

13 Q. I read in some document that your spouse is an
14 employee of Parexel --- if I'm pronouncing that company
15 correctly.

16 Is that still the case?

17 A. Yes.

18 Q. And does that company derive any revenues from
19 the sales, testing, clinical trials of any
20 pharmaceutical that is used to suppress puberty or is
21 used as a cross sex hormone?

22 A. I don't know the answer. Parexel is a very
23 large back office organization supporting clinical
24 research with many clients. And so you can envision

1 some connection buried in there, but I don't know
2 specifics.

3 Q. Fair enough.

4 ATTORNEY BROOKS: Let me have 54.

5 BY ATTORNEY BROOKS:

6 Q. Let me ask you to turn to paragraph 18 in your
7 expert report, and there in the first sentence you write
8 although the detailed mechanisms are unknown, there is a
9 medical consensus that there is a significant biologic
10 component underlying gender identity, closed quote.

11 Do you see that?

12 A. No, I might have pulled the wrong thing out.
13 Which ---?

14 Q. It's the expert report not the rebuttal?

15 A. Expert report. And it's which paragraph?

16 Q. Paragraph 18?

17 A. Oh, sorry.

18 Q. This is why lawyers number their paragraphs.

19 A. That is wise. All right. Paragraph 18.

20 Q. I'm just calling your attention --- and I have
21 read into the record the first sentence of that
22 paragraph.

23 A. I see it.

24 Q. And picking up on our earlier discussion about

1 consensus. When you say there is a medical consensus,
2 do you mean that all experts in the field agree or do
3 you mean that in your view this is a majority opinion?

4 ATTORNEY BLOCK: Objection to form.

5 THE WITNESS: So when I guess similar to
6 when we talked about guidelines if the question is, is
7 there unanimity, then there is never unanimity, so there
8 you go.

9 BY ATTORNEY BROOKS:

10 Q. Okay.

11 A. I can be a little stronger, though, because the
12 mainstream medical organizations have various statements
13 in this space. So for example, the endocrine society,
14 which is the largest international organization of
15 endocrinologists does actually have a statement where
16 the sum of the modeling for gender affirming care is
17 prefaced with statements that support this.

18 Q. In providing the basis for your opinion that
19 there is such a consensus, you cite only two papers and
20 those only papers that you had written yourself.

21 Did you consider those papers written by
22 yourself to adequately document the existence of the
23 medical consensus?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So both of the papers
2 reference reviews with larger bibliographies that
3 reference yet other papers that support the statement.
4 And when we're talking about what's informing the
5 statement, of course, is not limited to the specific
6 papers referenced, so that's part of the reason why I
7 gave that example, for example, the endocrine society's
8 formal statements on the project, which is a consensus
9 view of more people than myself, of course.

10 ATTORNEY BROOKS: Let me mark as
11 Exhibit 16, an article by Aruna Saraswat and others
12 entitled Evidence Supporting the Biological Nature of
13 Gender Identity from 2015 of which Dr. Safer is one of
14 the co-authors.

15 ATTORNEY WILKINSON: Tab 54.

16 | ---

17 (Whereupon, Exhibit 16, Aruna Saraswat
18 Article, was marked for identification.)

19 | ---

20 BY ATTORNEY BROOKS:

21 Q. And Dr. Safer, is that a paper that you --- I
22 guess I see by placement --- had supervisory
23 responsibility for?

24 | A. Yes.

1 Q. Let me --- I learned something in this
2 deposition, so that is good.

3 Let me call your attention to page two and
4 column two, and in the very bottom paragraph ---.

5 ATTORNEY BLOCK: I'm sorry, did you mean
6 200?

7 ATTORNEY BROOKS: I did mean 200. I
8 apologize. That is also the second page.

9 BY ATTORNEY BROOKS:

10 Q. In the bottom --- first column bottom paragraph
11 it states, quote, however it is important to note that
12 most transgender individuals develop a gender identity
13 that cannot be explained by atypical sexual
14 differentiation, closed quote.

15 A. So this is column two.

16 Q. Column one. If I misspoke I apologize.

17 A. I could have misunderstood at this hour.

18 Q. At the bottom paragraph?

19 A. However it is important to note, I'm there, yes.

20 Q. All right.

21 Can you explain to me what is meant by the
22 statement that most transgender individuals have a
23 gender identity that cannot be explained by atypical
24 transgender differentiation?

1 A. So that is referencing, in this context at the
2 time that this was written, the anatomy, genitals,
3 reproductive structures.

4 Q. And let me just --- for purposes of terminology,
5 you said at the time this was written. This is about
6 seven years ago, six years ago?

7 A. 2015, yes.

8 Q. And if you look at the page one, column one
9 abstract. This paper is using the term disorders, in
10 sexual development, and that DSD.

11 Do you see that?

12 A. I do.

13 Q. That was a term that you were comfortable with
14 most recently?

15 A. It was a terminology that I was using that
16 recently, yes.

17 Q. The point here, on page 200, column one, that we
18 were just looking at is, in fact, most transgender
19 individuals do not suffer from any identifiable DSD.

20 Is that what this is saying?

21 A. From a physically identifiable DSD, that is what
22 this is saying, yes.

23 Q. Physically, genetically, hormonally,
24 identifiable by any physical measurement.

1 Correct?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: So you have to be careful
4 to be not too broad, and part of the reason is the line
5 there is actually blurring. So when I'm sitting here
6 and talking in 2022 I recognize that there is a
7 potential for some blurring in that line. But in 2015
8 it was certainly understood to be how you're saying it.
9 BY ATTORNEY BROOKS:

10 Q. Well, it remains true today, does it not, that
11 the overwhelming majority of transgender individuals do
12 not suffer from any identifiable atypicality
13 genetically, physically or hormonally.

14 Correct?

15 A. Well, that's not how I would say it, because
16 gender identity is a biological phenomenon and so one
17 would predict that as we identify certain correlates or
18 even explanations, than we will have things in that
19 space. But if we're talking about how things were
20 defined in 2015, being transgender was defined as
21 somebody where their gender identity was not aligned
22 with the rest of their biology, and there was no
23 apparent, physical variation either in terms of their
24 anatomy or their chromosomes in terms of their genitals,

1 in terms of their reproductive anatomy or in terms of
2 their chromosomes. So that is how it was defined at the
3 time.

4 Q. Well, today, and using identifiable to mean you,
5 Doctor safer, are able to identify it now, not
6 hypothetically in the future, it remains true that the
7 overwhelming majority of transgender individuals do not
8 suffer from any current identifiable, physical
9 chromosomal or hormonal irregularity.

10 Correct?

11 A. I would say that right now in 2022, it would be
12 true to say that a transgender person does not have an
13 identifiable genital difference almost by definition or
14 a --- or an internal reproductive organ difference
15 almost by definition. Chromosomal I can't say, because
16 we actually don't check. And hormonal gets even grayer
17 than that, because it could be the case that there are
18 hormonal exposures, for example, in utero that explain
19 at, least some people as being transgender.

20 Q. As you sit here today, you don't know of any
21 chromosomal test that can identify an individual as
22 transgender, do you?

23 A. Is there a --- there --- as I sit here today
24 there are no tests to identify somebody who is

1 transgender.

2 Q. And that includes genetic tests?

3 A. There's no scan and there are no blood tests and
4 there are no genetic tests.

5 Q. And no hormonal tests?

6 A. That's right. There are no hormonal tests right
7 now to identify a transgender person.

8 Q. As you sit here today and based on your whole
9 knowledge of the field, there is no biological test from
10 some mental professionals, as they can do, but there is
11 no biological test that will tell you in advance which
12 prepubertal child who is suffering from gender dysphoria
13 would persist and which would desist as they enter
14 adolescence?

15 A. So I would have to challenge how you're stating
16 that a little bit just so that we are cleaner in terms
17 of how we think. So we're thinking right now in terms
18 of identifying kids who are transgender. We use various
19 terminologies, so that --- we've have been using the
20 term gender dysphoria we're going to be shifting to more
21 gender incongruence, but we're trying to identify people
22 who are transgender and who may require intervention
23 later.

24 Recognizing further that only a subset of

1 transgender people would require a medical or surgical
2 intervention. And so if the question is can --- is
3 there a test now in 2022 to determine in an prepubescent
4 kid who says they're transgender or people who suspect
5 may be transgender on whatever they're saying, no, there
6 is no test to know that is true or not and to know if
7 they'll think that later or not, and to know if they'll
8 want treatment or not.

9 Q. So it is your opinion that there is consensus
10 that there is a biological basis for transgender
11 identification, but as of 2022 you don't know with any
12 confidence what that biological basis is.

13 Correct?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: I would say that it is
16 complicated and there may even be more --- there might
17 be multiple explanations for people being transgender.
18 We see that with other biological entities like
19 diabetes, for example. So the idea that we don't know
20 what it is, is also a little too narrow.

21 BY ATTORNEY BROOKS:

22 Q. You don't know any one identifiable biological
23 cause with any confidence that state within a scientific
24 knowledge?

1 A. No. That's not quite true. We know that ---
2 and it's not even the biology of being transgender even
3 though that is how I just framed it. It is even one
4 step back which is the biology of gender identity. We
5 all have gender identity, and how is that determined and
6 what is that biology. And we know there --- and we know
7 then that some transgender people have that particular
8 biology not aligned with some of their other biology.

9 So going back to what you just asked, that we
10 don't know any mechanisms is not quite true. That is
11 people that looks to be true that exposure to androgen,
12 male hormones in utero can have some influence on some
13 people as to their identity.

14 Q. Well, if there is not yet any test that is
15 predictive of gender identity in a prepubescent child,
16 then as a matter of science it follows that you don't
17 actually know any causal relationship, any biological
18 basis, is that not true?

19 A. No, that wouldn't be quite sure. We can't test
20 for somebody deemed transgender, and we can't test
21 gender identity with a test. But like I said, that at
22 least in some circumstances the androgen exposure in
23 uterus, in a mother's womb, could be part of the
24 explanation for some people. Maybe isn't all the

1 explanation for some people.

2 Q. It could be, but no science has been done to
3 prove that that is a fact, has it?

4 A. So it isn't really a hypothetical, that is we do
5 have --- we do have data that support it, but it doesn't
6 lead us to a test.

7 Q. If it is not testable, then it is a hypothesis,
8 not a fact, isn't it, not of science.

9 Correct?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: No, that is using testing
12 two different ways. So in a scientific study, then a
13 hypothesis is something that you have based on a certain
14 --- based on certain data, but then you test to see how
15 true it might be. But when I was using the word test,
16 I'm talking about like a blood test or something that we
17 could actually do on a given individual to know their
18 circumstance with regard to their gender identity.

19 BY ATTORNEY BROOKS:

20 Q. Let me ask you to look at the paper that I've
21 marked as Exhibit 16, Evidence Supporting the Biological
22 Nature. Is that that which you have in front of you?

23 A. I do, yes.

24 Q. And on the first page you refer under the result

1 that begins by discussion of a seminal study by
2 Meyer-Bahlburg. Do you see that? Second column,
3 beginning of the results section.

4 A. Yes.

5 Q. And is it your contention that the
6 Meyer-Bahlburg study provides evidence of a biological
7 basis for transgender identification?

8 A. What the Meyer-Bahlburg study does is it
9 provides evidence of a biological basis for gender
10 identity.

11 Q. Well, specifically the study, the Meyer-Bahlburg
12 study --- let me have that so we are not shooting in the
13 dark. Exhibit 17 is a paper from 2005 from Professor
14 Heino Meyer-Bahlburg, entitled Gender Identity Outcome
15 in Female Raised 46, comma XY persons with penile
16 agenesis, and it continues. It's a long document?

17 ATTORNEY WILKINSON: Tab 14.

18 ---

19 (Whereupon, Exhibit 17, 2005 Paper by
20 Professor Heino Meyer-Bahlburg, was marked
21 for identification.)

22 ---

23 BY ATTORNEY BROOKS:

24 Q. I believe the level of questions that I will be

1 asking, however, are the ones that you will know off the
2 top of your head given the importance of this study in
3 the field. The study concerned exclusively children who
4 are born with what's referred to as a 46 XY condition.

5 Right?

6 A. Yes.

7 Q. And that is long recognized as a DSD?

8 A. No, 46 XY is the classic male chromosome
9 pattern.

10 Q. Yes. Pardon me. So these are individuals with
11 typical male pattern chromosomes?

12 A. Yes.

13 Q. Who, however, for some reason have had a
14 developmental disorder or defect affecting their
15 genitals?

16 A. Who have had some sort of alteration or
17 development of their genitals, exactly.

18 Q. And the study concerns the results of efforts to
19 raise such genetically male children as female in some
20 cases after surgical procedures to feminize them and in
21 some cases absent surgical procedures.

22 Correct?

23 A. The study really relates to the gender identity
24 of those where there is an attempt to raise them as

1 females.

2 Q. And the results, if I understand the study, were
3 mixed, that is that some of the individuals who were
4 raised as females nevertheless came to identify as male
5 and some of the individuals who were raised as females
6 came --- persisted in identifying as female.

7 Correct?

8 A. It is not actually as clean as you're saying it.
9 So we should look at some of the specifics and we might
10 need to point out to specific sentences, but this too is
11 a survey of --- a survey of studies, to be clear, it's
12 not its own isolated study, and then there --- in none
13 of these studies were they systematic or, you know, I
14 guess I will just use the word systematic in
15 ascertaining that all of the people who were being
16 raised female and ascertaining all of the gender
17 identity of those people. But what they are really
18 observing is that the numbers that they mention of the
19 people who they were trying to raise female who had male
20 gender identity were whatever the numbers were. I don't
21 know if that makes sense, but you'll follow as
22 necessary.

23 Q. If you turn to page 432 it begins under the
24 heading discussion. It begins, quote, the main findings

1 can be summarized as follows. One, the majority of 46
2 XY individuals with presumably normal male prenatal
3 hormonal milieu, comma, non-hormonal anatomic
4 abnormalities of the genitals, comma, and female gender
5 assignment at birth or in early childhood have not
6 changed gender to male. Do you see that?

7 A. I do see it.

8 Q. And one thing, and I understand the
9 qualifications that you've just described this is not
10 recording a carefully structured study performed by
11 Doctor Meyer-Bahlburg but rather a review of case
12 histories.

13 Right?

14 A. Exactly.

15 Q. But his conclusion from his review of those is
16 that the majority of genetically presumably normal male
17 individuals who were raised female, and I believe it's
18 fair to summarize in most cases after feminizing genital
19 surgery, adhered to a female gender identity at least to
20 the data we have?

21 A. Yes, so I don't know whether they actually all
22 had surgery or not.

23 Q. They did not all have surgery.

24 A. Right or even the larger number. I don't know.

1 I would have to go through.

2 Q. Fair enough.

3 A. But the --- and it was his opinion at the time
4 he was writing this that the majority who were reared
5 female were living as female, although we don't know
6 their gender --- but now this is me stepping out, saying
7 we don't know their gender identity, nobody asked. The
8 reason why this paper is interesting is even in the
9 circumstance where they were being so passive in how
10 they were collecting the data, such a large fraction of
11 these individuals were so clear in their male gender
12 identity that they actually identified themselves
13 against the protocols.

14 Q. And that seemed to be evidence that --- of a
15 biologic basis of gender identity congruent with their
16 male genetics.

17 Correct?

18 A. That --- for these people, that's right. That
19 is with or --- with their chromosomes.

20 Q. Right.

21 A. Which you would predict. If we think about ---
22 if we recognize --- if we think that by survey a half a
23 percent or even a full percent of people are transgender
24 that would mean that 99 percent of people are cisgender.

1 And so if you take a population of people with certain
2 chromosomes, 99 percent of them are going to be
3 cisgender and will have a gender identity incongruent
4 with their chromosomes.

5 Q. The study includes no individuals who were
6 raised with a gender identity inconsistent with their
7 male chromosomes who came to identify or later perceived
8 themselves as identifying as female.

9 Correct?

10 A. Well, we don't know that because they were ---
11 they're all XY individuals who were being raised female.
12 And somebody who had a female gender identity who is
13 transgender among them would never be identified as
14 transgender in this case.

15 Q. So my question was a little more specific. The
16 study simply doesn't include any individual who had male
17 chromosomes who was raised male who came to identify as
18 female?

19 A. That's correct. All of these people who are XY
20 chromosome people raised female.

21 Q. And you would agree with me, would you not, the
22 study provides some evidence that external forces such
23 as feminizing surgery or how their parents treat the
24 child can have some influence on the formation of gender

1 identity?

2 A. I can't say that because the study really
3 doesn't go there. The study is only passive observation
4 and all --- the only thing I would say with some
5 confidence is that some fraction of these individuals
6 who are so clear in their gender identity that despite
7 nobody even looking for that sort of thing, because that
8 wasn't even a consideration when these --- when these
9 cases occurred, they --- the individuals spontaneously
10 announced to the authorities around them, parents and
11 doctors, that they were wrong, that the parents and
12 doctors were wrong.

13 Q. And that, in your view, provides at least some
14 evidence of a genetic basis for gender identity
15 congruent with chromosomal sex?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: No. It provides some
18 evidence of a biological basis for gender identity that
19 can't be manipulated externally.

20 BY ATTORNEY BROOKS:

21 Q. Well, considering that the study included no
22 examples of any individual who adopted a transgender
23 identity inconsistent with how they were raised, the
24 study simply can't provide any information about

1 biologic basis of transgender identification, can it?

2 A. Wait. I think say that again.

3 Q. The study includes no individuals who adopted a
4 gender identity, a transgender identity apart from
5 social transition and, therefore, can provide no
6 information one way or the other about whether there is
7 or is not a biologic basis for transgender
8 identification?

9 A. So not quite. So the --- because remember the
10 point is that gender identity, period, universally, has
11 a biological basis. It's not that we --- and to be
12 clear, I don't even know that we won't find and some
13 people even wonder if we will find a gene that
14 associates a gene with transgender, per se. But I'm not
15 even saying that. If there's --- I'm only saying that
16 we will find let's say genes associated with gender
17 identity and not everybody will have them aligned with
18 the rest of their biology. So I just want to preface
19 with that.

20 And in this particular review, they're taking
21 people who have XY chromosomes exclusively. So
22 therefore, if one --- if a certain fraction of them were
23 to have female gender identity despite assuming
24 different development they would have had male --- they

1 would have had other male biology, those are the people
2 we would have categorized as transgender using current
3 definitions. And those individuals would not have been
4 apparent in this study they were being raised female
5 anyway.

6 Q. And my point was that, therefore, that this
7 study can't provide any information about whether there
8 is or isn't a biological basis for transgender
9 identification?

10 A. So yes. I guess how you are framing that is
11 where I'm pushing back. So the point of this study is
12 as evidence of there being a biological basis of gender
13 identity period, having nothing --- not necessarily for
14 being transgender. In fact, I don't even know if there
15 --- yeah, I don't even know if that would be the model.
16 The model would be somebody who has a certain gender
17 identity, a certain other biology, and then that
18 combination is what we are calling transgender.

19 Q. You also referenced a paper by Doctor Reiner.
20 And let me have that.

21 ATTORNEY BROOKS: And I will mark that as
22 Exhibit 18, 2004 Discordant Sexual in Some Genetic Males
23 With Cloacal Exstrophy Assigned to Female Sex at Birth.

24 ATTORNEY WILKINSON: Tab 71.

1

2

(Whereupon, Exhibit 18, Paper by Doctor

3

Reiner, was marked for identification.)

4

5

BY ATTORNEY BROOKS:

6

Q. And Dr. Safer, you are well familiar with this

7

paper.

8

Am I correct?

9

A. I am, yes.

10

Q. And this is the only other paper that you cite

11

for the assertion that gender identity has a biological

12

basis.

13

Am I correct?

14

A. No, there are a range of categories of papers,

15

but these are two of my favorite papers in the first

16

category, which is the category of attempting to

17

manipulate gender identity externally.

18

Q. Dr. Bahlburg in his paper, on page 433 of

19

Exhibit 14, in column one ---.

20

A. Yes. Let me get there.

21

Q. Yes. 433, column one.

22

A. 433, column one.

23

Q. He says about two inches off the bottom,

24

referring to the Reiner and Gearhart paper of 2004,

1 which I believe is this paper, he says, quote, it has
2 serious methodological flaws. Do you agree with that
3 statement?

4 A. Let's read what he is criticizing. All these
5 papers have their weaknesses. All right. So the
6 remainder of that --- so the remainder of the paragraph
7 is --- details the complaints for Doctor Meyer-Bahlburg,
8 where his --- which I focus as a social science
9 researcher that they didn't do various assessments that
10 would make it --- that would make standard people doing
11 some of this research able to replicate some of the
12 items in the paper. And I will --- so while Doctor
13 Meyer-Bahlburg may be frustrated and be complaining
14 about that, he is not actually attacking the veracity of
15 their results.

16 Q. Well, the point was serious methodological flaws
17 is you are not really able to evaluate the veracity of
18 the results.

19 Correct?

20 A. Not necessarily.

21 Q. Do you agree with Doctor Meyer-Bahlburg's
22 evaluation that the methodology of the study reported by
23 Reiner and Gearhart suffers from serious methodological
24 flaws?

1 A. No.

2 Q. So let's summarize this study if I may. I'm
3 turning to page 334.

4 A. And extending that too, part of his frustration
5 wouldn't be my frustration because I am not looking for
6 those particular endpoints, that is for my purposes for
7 determining whether gender identity is a biological
8 basis Reiner and Gearhart's paper is actually quite
9 strong.

10 Q. Let's look at the first page in the summary up
11 front. It refers to this paper dealt with 16 --- under
12 methods, 16 genetic males.

13 Correct?

14 A. Yes.

15 Q. And these were all males who suffered from ---
16 uses the word in the second line of the background as
17 severe developmental disorders affecting their genitals.

18 Correct?

19 A. That's how it is phrased here. Where am I
20 seeing that?

21 Q. The second line of the background says severe.

22 A. Severe phallic inadequacy, yes, I see that.

23 Q. Which is to say not --- absent or severely
24 disformed penis?

1 A. That's what that means, yes.

2 Q. Okay.

3 But these are individuals who are genetically
4 male, and more than that, on page 334, column two,
5 two-thirds of the way down it says the testes were
6 histologically normal in all 14 when examined?

7 A. I'm on column two.

8 Q. It is column two.

9 A. I apologize.

10 Q. You can kind of see where my finger is pointing
11 here.

12 A. And this is under ---.

13 Q. Under methods and the paragraph that begins
14 parents to be educated?

15 A. Testes were histologically normal in all 14.
16 I'm there, yes.

17 Q. So we had individuals who were genetically male
18 that had normal testes and had severe deprivation of
19 their penis or it was absent?

20 A. Yes.

21 Q. And what was done to these 14 subjects, looking
22 just above that, is that they were assigned a female sex
23 surgically by means of orchiectomy and construction of
24 vulva.

1 Right?

2 A. Yes.

3 Q. And orchiectomy is another medical term for what
4 the layman thinks of as castration?

5 A. As removing the testes.

6 Q. And construction of the vulvi is creating a ---
7 I'm not sure what the right term is, a pseudo vagina?

8 A. It wouldn't be a pseudo vagina, but creating a
9 vagina.

10 Q. It says that --- just immediately following the
11 description of the surgery 14 of these 16 --- looking
12 back at the results paragraph and the abstract, 14 of
13 these 16 were assigned female but later declared
14 themselves male despite the surgery, despite being
15 raised as female.

16 Right?

17 A. Right, 8 of the 14 who were assigned female.

18 Q. I'm sorry, I misread that. Thank you. Eight of
19 the 14 who were assigned female nevertheless declared
20 themselves male at some stage?

21 A. That's correct.

22 Q. And the two who had been raised as males, even
23 though they suffered the same type of phallic
24 developmental defect, remained identifying as males.

1 Correct?

2 A. Yes.

3 Q. There was an --- whatever assignment was made,
4 this was made to infants. It wasn't made or based on
5 any choice or reported sense on the part of the child?

6 A. That's exactly right, yes.

7 Q. So several of these individuals, specifically
8 six, who were assigned female at least throughout the
9 period identified by this study adhered to a female ---
10 living out the female gender identity?

11 A. Actually it was five because one of the children
12 refused to have contact with the surgeons when some of
13 these conversations began to take place.

14 Q. So we know that five --- we don't know what that
15 person was thinking, feeling or identifying --- but we
16 know that five ---?

17 A. They were angry.

18 Q. They were angry. Whichever that came out, I'd
19 be angry, so ---

20 A. Yes.

21 Q. --- so 5 of the 14 subjects who were assigned
22 female and surgically transitioned and socially
23 transitioned continued to at least physically identify
24 as female?

1 A. As of when they wrote the paper they were still
2 identifying as female as far as I remember. That's
3 right.

4 Q. And it would be your position that visibly
5 identifying as female doesn't necessarily mean that they
6 were generally transgender?

7 A. That --- we don't know that because that wasn't
8 asked.

9 Q. Is it your view that if you had these children
10 who were surgically transitioned, socially transitioned
11 visibly identifying as female, that if you had simply
12 asked them you would have found out the undoubted truth
13 about their gender identity?

14 ATTORNEY BLOCK: Objection to form.

15 THE WITNESS: So it is true that as
16 people develop and assuming that there are good language
17 skills and that there aren't other developmental, mental
18 developmental reasons or other mental health reasons why
19 people would not be clear, that people are able to
20 articulate their gender identity. Certainly adults do
21 so apparently quite reliably and older teenagers the
22 same, so depending on age. But yes, there would be a
23 point in time when you could simply ascertain that by
24 asking.

1 BY ATTORNEY BROOKS:

2 Q. Dr. Safer is that fundamentally a medical
3 question or a psychology/mental health question? The
4 question of the reliability of a patient's self report?

5 A. I don't know that I separate it that way. I say
6 that based on the data we slowly develop overtime of
7 transgender people where we see that any absence of
8 other confounding items along the lines that I said,
9 people at a certain stage in maturity who tell you a
10 certain thing about their gender identity are consistent
11 in that regard.

12 Q. This study, the Reiner Gearhart study,
13 Exhibit 18, concerns --- looks at the effect of trying
14 to raise individuals in a gender identity discordant
15 with their chromosomal sex.

16 Correct?

17 A. It is discorded with quite a number of things,
18 but yes, chromosomal is one of your hard data points.

19 Q. This study does not look at the question about
20 whether and when or how any sort of intervention might
21 encourage development of a gender identity consistent
22 with one's genetics sex; does it? It simply does not
23 look at this issue?

24 A. Say that again, sorry.

1 Q. This study does not address the question of
2 whether or how or at what developmental stage
3 therapeutic interventions might encourage the
4 development of a gender identity consistent with one's
5 chromosomal sex?

6 A. The study is --- the way I'm interpreting the
7 study is it's looking at our inability to manipulate
8 gender identity. And it's just that. And I'm a little
9 fuzzy on the rest of what you're asking me.

10 Q. Well, the study looks at efforts to manipulate
11 gender identity away from chromosomal from the identity
12 normally associated with one's chromosomal sex. In this
13 case the male sex.

14 Right?

15 A. It does.

16 Q. This study simply does not look at efforts to
17 manipulate gender identity towards alignment with the
18 identity normally associated with a subject's
19 chromosomal sex?

20 A. I think I'm following you now. So you're
21 suggesting that if we took a transgender person and
22 tried to manipulate their gender identity to align with
23 some of the rest of their biology?

24 Q. I'm not suggesting that I'm simply saying this

1 study.

2 A. That particular instance. Yes.

3 ATTORNEY BROOKS: 15. It is one of the
4 previous marked ones, if that matters. All right.

5 I will not show you that document. Let
6 me ask the court reporter how many --- how much time we
7 have left on the clock.

8 COURT REPORTER: I have 5:52, five hours
9 and 52 minutes.

10 ATTORNEY TRYON: I didn't hear that.
11 Could you repeat that?

12 ATTORNEY BROOKS: We've got an hour and
13 eight minutes according to the clock of the court
14 reporter here, and I believe that our friend in the
15 ether is calculating separately.

16 VIDEOGRAPHER: Correct. And it sounds
17 like the same. I have to do the math.

18 ATTORNEY BROOKS: Okay.

19 BY ATTORNEY TRYON:

20 Q. Are you familiar Dr. Safer with a paper recently
21 published by Lisa Littman of Brown University looking at
22 the surveying 100 teens or young adults --- actually
23 surveying a hundred individuals who report having
24 de-transitioned and gone from identifying as transgender

1 to identifying in a manner consistent with their genetic
2 sex?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: So I'm aware of Dr. Littman
5 having written a second paper. But I'm not facile, I
6 guess.

7 BY ATTORNEY BROOKS:

8 Q. You haven't read that paper?

9 A. I have not read the paper. I probably did read
10 it, but I would not be able to be quizzed on it.

11 Q. Then I won't quiz you on it. I always tell
12 witnesses I don't know is the easiest way out of a line
13 of questioning.

14 Are you --- let me ask you this, does your
15 clinic have any procedure in place to track outcomes on
16 patients on whom you perform gender conforming surgery
17 long term?

18 A. We're actually in the --- we have a couple of
19 processes, so I guess the short answers are yes and
20 we're going to be more rigorous going forward.

21 Q. Do you have any knowledge as to how many
22 patients on whom your clinic has performed surgery have
23 after that surgery committed suicide?

24 A. I don't off the top of my head know that.

1 Q. Do you believe that your clinic possesses
2 reasonably complete information on that question?

3 A. I actually don't think our information is
4 sufficiently complete currently, and that actually is an
5 area where we're going to develop more vigorously,
6 because I would actually like to know that.

7 Q. Do you know whether any patients on whom your
8 clinic has performed surgery has subsequently sought to
9 de-transition and take on or revert to, whichever way
10 you want to see it, a gender identity that's aligned
11 with their chromosomal sex?

12 A. So it's a complicated question. And actually I
13 just want to go back to the first part where you were
14 talking about suicide.

15 To be clear, the rigor I'm talking about is not
16 suicide focused, because I actually am not anticipating
17 that that is --- that that is happening or is happening
18 more than with being seen in a general population, but
19 for all encompassing that we do definitely need that.

20 But back to your current question ---.

21 Q. Let me jump back to suicide for a moment. Are
22 you aware of studies coming out of DeVry University and
23 Amsterdam suggesting that post-surgical transgender
24 populations continues to experience elevated rates of

1 complete suicides compared to controlled populations?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: So I'm aware that
4 transgender people have more mental health morbidity
5 than other populations. Once corrections are made for
6 other confounding factors I don't know that we would
7 have --- that we're very clear yet on those data
8 including ---.

9 BY ATTORNEY BROOKS:

10 Q. When I refer to a published study coming out of
11 DeVry University of Amsterdam showing high rates of
12 suicidality in postsurgical transgender patients, you
13 believe you're familiar with that literature?

14 A. I guess it would fall in the same category as
15 Littman's second paper.

16 Q. Okay.

17 A. Where I'm familiar with the fact that they're
18 doing surveys and I'm familiar with the broad outlines,
19 but could not ---

20 Q. Okay.

21 A. --- comment on specific studies without it being
22 in front of me.

23 Q. And have any patients on whom your clinic has
24 performed surgery subsequently decided to de-transition

1 and assume a gender identity aligned with their
2 chromosomal sex?

3 A. I don't --- I don't know. There is absolutely
4 the case that there are people who stop their treatment
5 at different levels, so it has definitely been my
6 experience that I have patients who I've put on hormone
7 treatments who have stopped those hormone treatments.
8 And there are also, among our patients --- I don't know
9 if any of the patients where we performed the original
10 surgery they actually were opting for a different
11 surgery, but we definitely have patients who have come
12 to us, who had a surgery done elsewhere who were looking
13 for a degree basically what you're calling a reversal,
14 to the degree that that's possible. So that such a
15 thing does exist. So the point about saying that they
16 have a different gender identity, that would --- that is
17 not typically how the patients come saying it. They
18 don't say, oh, it turns out my gender identity is not
19 that. It's more often society is not treating me well,
20 this isn't working out. That's the more --- that's the
21 --- that's the typical scenario. I mean, yes, we
22 definitely have seen that circumstance.

23 Q. Dave Tryon, who is with us remotely as Counsel
24 for West Virginia, I have promised him an hour, so I

1 have to stop, even though I have so many more
2 interesting questions.

3 ATTORNEY BROOKS: So Dave, I will stop
4 and I will turn the witness over to you.

5 ATTORNEY BLOCK: Could we take a break
6 now?

7 ATTORNEY BROOKS: Of course, it is a good
8 time for sure.

9 ATTORNEY BLOCK: Thanks. Can we go off
10 the record?

11 VIDEOGRAPHER: The time is 5:03 p.m.
12 Eastern Standard Time.

13 OFF VIDEOTAPE

14 ---

15 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

16 ---

17 ON VIDEOTAPE

18 VIDEOGRAPHER: We are back on the record.
19 The current time reads 5:25 p.m. Eastern standard Time.

20 ATTORNEY BLOCK: This is Josh Block on
21 behalf of the Plaintiff. We have conferred off the
22 record, including with counsel from Mount Sinai, and
23 Doctor Safer can answer the two questions he declined to
24 answer before provided that we mark those portions of

1 the deposition transcript confidential, and all counsel
2 for Defendants have agreed with that.

3 ATTORNEY BROOKS: And this is Roger
4 Brooks, and yes, I confirm that all counsel for
5 Defendants have agreed to that.

6 CONFIDENTIAL PORTION BEGINS
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EXAMINATION

BY ATTORNEY TRYON:

Q. Hello, Dr. Safer. Thanks for your time today. So I am David Tryon. I represent the State of Virginia. I'm appointed by the Attorney General's Office. And I wanted to start out by looking at --- asking you to take a look at your Rebuttal Report. I don't recall what exhibit number that is. If you could tell us what it is marked?

ATTORNEY WILKINSON: Exhibit 2.

ATTORNEY TRYON: Exhibit 2.

ATTORNEY WILKINSON: Tab 51.

THE WITNESS: I have that in front of me.

BY ATTORNEY TRYON:

Q. Could you take a look at paragraph six, please? Do you have that in front of you?

A. Yes.

Q. Great. Now, in here it says in the second or maybe third sentence as reflected in the same source cited by Doctor Brown dimorphous sexual characteristics in men and women are produced by a combination of genes, prenatal androgen exposure to sex hormones. And I'd

1 like to focus on that particular clause. Can you
2 explain what prenatal androgen exposure to sex hormones
3 is?

4 A. Yes. That references --- I guess to me it's
5 more or less exactly what it says, which is that the
6 developing fetus is exposed to various hormones and
7 other factors and androgen is specifically the male ---
8 is typically what we consider to be the male sex
9 hormone, although everyone has some. And then prenatal
10 just means and in utero or in the mother's womb.

11 Q. So androgen for males is testosterone.

12 Is that right?

13 A. Androgen in general is that category of hormones
14 that we think of as typically male, even though, like I
15 said, we all have them. And one of the androgens is
16 testosterone. And with adults it is the one that we are
17 talking about most of the time, of course.

18 Q. Okay.

19 So as I understand it, your suggestion is that
20 that prenatal exposure to testosterone can have an
21 impact even after birth.

22 Is that right?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: So all factors --- well, I

1 don't want to overstate it, but factors that occur to
2 which a fetus is exposed in the womb have impact on the
3 development of that fetus, of that person when they are
4 born, and so androgens, including testosterone, would be
5 part of that, so yes.

6 BY ATTORNEY TRYON:

7 Q. So are you aware of studies addressing the
8 impact of prenatal exposure to testosterone as it
9 impacts people after their birth?

10 ATTORNEY BLOCK: Objection to form.

11 THE WITNESS: I think I need you to be
12 specific about which studies.

13 BY ATTORNEY TRYON:

14 Q. Are you aware of any study that addresses the
15 effect of prenatal testosterone upon boys after they're
16 born?

17 ATTORNEY BLOCK: Objection to form.

18 THE WITNESS: So the ---.

19 BY ATTORNEY TRYON:

20 Q. Or men?

21 A. So I can --- I guess --- I have to --- kind of
22 two answers. Exposure to prenatal androgens, kind of
23 generally because it is not always, testosterone explain
24 the development of what we consider to be typically male

1 genitalia so that all babies born with what --- with a
2 penis and with a urethra that is the part for which you
3 urinate, that's up inside the penis and having the
4 gonads, which would typically be testes in the scrotum,
5 all of that happens in response to testosterone.

6 BY ATTORNEY TRYON:

7 Q. And then that also triggers a question I had.
8 You had previously said in your original report a
9 person's genetic makeup and internal and external
10 reproductive anatomy are not useful indicators of
11 athletic performance and have not been used in a league
12 competition for decades.

13 My question on that is, when you say a person's
14 genetic makeup doesn't their genetic makeup trigger
15 whether or not they are going to --- a person's genetic
16 makeup will determine whether or not they're a boy or a
17 girl, and therefore if they're a boy that would trigger
18 their generation of more testosterone than a girl.

19 Is that a fair statement?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: Yeah, no, that's --- so I
22 think I need to walk that back a little bit. Why don't
23 we --- can we do it like piece by piece or have you
24 restate parts?

1 BY ATTORNEY TRYON:

2 Q. I will restate it. So when you say a person's
3 genetic makeup, what does that mean?

4 A. Mostly in this context I'm referencing their
5 chromosomes that's the specific that in the further past
6 was actually being used to identify people which we no
7 longer do. It's not sufficiently reliable.

8 Q. Does the --- you have an X Y chromosome that is
9 typically considered to mean that you're a male.

10 Correct?

11 A. The XY chromosome is typically considered to
12 mean that you're a male, correct.

13 Q. And that would mean that you would be generating
14 more testosterone than if you have an X chromosome.

15 Right?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: So the presence alone of
18 that XY pattern is insufficient to know with certainty
19 that you're producing more testosterone and that is part
20 of the point of I'm saying it is that biological sex is
21 more complex, and you could have the gene for the testes
22 that produce testosterone elsewhere, and then you
23 wouldn't have that pattern and you still would be
24 producing the testosterone or vice versa.

1 BY ATTORNEY TRYON:

2 Q. Okay.

3 Well, let's go back to prenatal testosterone.
4 So you're not --- if I understood what you're saying
5 before, you're not aware of any studies that show
6 whether or not prenatal testosterone would have --- let
7 me just start that over again.

8 Are you aware of any studies that address
9 whether prenatal testosterone has impact on sporting, on
10 athletics in children after birth?

11 A. Correct. That would be right to say that there
12 are no studies of which I'm aware that can associate
13 prenatal testosterone with athleticism. And I don't
14 know what levels we're even talking. Like an adult
15 level? What's your question there?

16 Q. My next question is, have you heard of the
17 Journal of Sports Science and Medicine?

18 A. I guess you would have to show it to me.

19 Q. Okay.

20 Have you ever heard the name Jim Goldby or
21 Jennifer Mays?

22 A. No.

23 ATTORNEY TRYON: Jake, could you bring up
24 the Exhibit that I sent to you today, which is the

1 General Sports Science and Medicine?

2 ATTORNEY WILKINSON: Do you see anything?

3 THE WITNESS: I don't see anything. Oh,
4 that'S too small. Okay. That's okay.

5 ATTORNEY TRYON: Okay.

6 And this will be Exhibit --- what Exhibit
7 are we on Jake, do you know?

8 VIDEOGRAPHER: This is 19.

9 ---

10 (Whereupon, Exhibit 19, Article, was
11 marked for identification.)

12 ---

13 ATTORNEY TRYON: I'm sorry, 19?

14 VIDEOGRAPHER: Correct.

15 BY ATTORNEY TRYON:

16 Q. Okay.

17 I take it from your earlier answers, you
18 probably never seen it before.

19 Is that right?

20 A. I certainly don't recall. I don't want to state
21 definitively I've never seen it either, but it's
22 certainly not a paper that I'm going to know off the top
23 of my head.

24 Q. Well, let me ask you to take a look at the

1 conclusion on page 449?

2 A. So can we move the pictures because they're
3 blocking.

4 Q. Can you see it?

5 A. We're getting there. And then is there a way to
6 move that? Oh perfect. Yes.

7 Q. Okay.

8 The conclusion says, current paper provides
9 initial support from an association between prenatal
10 testosterone levels and mental toughness, optimism, goal
11 orientations, coping strategies and hostility, period.
12 Findings tentatively suggest that the mentioned
13 psychological characteristics may be partially
14 biologically predetermined.

15 Do you see that?

16 A. I do see it, yes.

17 Q. Do you have any reason to believe whether that's
18 true or not true?

19 ATTORNEY BLOCK: Objection. I just
20 object to asking him about a conclusion when he just has
21 a little snippet of that and hasn't reviewed the
22 article. And I'm not even sure if it has been cited in
23 the other expert reports.

24 THE WITNESS: I certainly can ---.

1 BY ATTORNEY TRYON:

2 Q. Go ahead.

3 A. I certainly cannot say if that conclusion has
4 any logic to it without knowing the study.

5 Q. Understood. Is it possible since this
6 particular study suggests there is an impact on adults
7 by prenatal testosterone? Is it that prenatal
8 testosterone could also have a DSD explanation for why
9 should boys at 11 years old have more athletic ability
10 than girls?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: So speaking --- yeah,
13 speaking as an expert, I can't give you an expert
14 comment there without seeing their study.

15 BY ATTORNEY TRYON:

16 Q. Okay.

17 So you just can't say one way or the other.

18 Correct?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: I mostly wouldn't want to
21 comment on their study. I will only make the
22 observation that the data of which I am aware do not
23 show differences for prepubertal children, if that was
24 part of your question.

1 BY ATTORNEY TRYON:

2 Q. And so the performance data that Dr. Handelsman
3 pointed out showing that there are some damages given
4 before puberty, you reject those?

5 ATTORNEY BLOCK: Objection to form.

6 THE WITNESS: So those broad
7 cross-sectional studies don't get at input, whether they
8 are referencing biological explanations versus societal
9 explanations.

10 BY ATTORNEY TRYON:

11 Q. Okay.

12 Whether it's societal or biologic explanations,
13 Handelsman still demonstrated that there is an advantage
14 for pre-pubescent males over females in athletics.

15 Right?

16 ATTORNEY BLOCK: Objection to form.

17 THE WITNESS: No, neither Dr. Handelsman
18 in his paper --- he doesn't actually say that. And if
19 you --- I think we looked previously at one of the
20 figures where specifically the range of outcomes, if you
21 were to repeat the study, included the girls doing
22 better than the boys.

23 BY ATTORNEY TRYON:

24 Q. Well, that was only one of them. That was not

1 it. That was one of the charts. The other chart showed
2 that there was an advantage, right?

3 ATTORNEY BLOCK: Objection to form.

4 THE WITNESS: The other --- yeah, let me
5 think with that one. Right. We are not getting into
6 what the causality is, then the other charts did show
7 the boys doing better. And again, the caveat remains
8 what is not --- what is not demonstrated there is that
9 there is --- that that is a biological thing versus
10 simply the very longstanding societal and cultural
11 environments.

12 BY ATTORNEY TRYON:

13 Q. And you've contended that there's a biological
14 component to gender identity.

15 Correct?

16 A. Yes.

17 Q. Which we have not been able to identify in this
18 deposition.

19 Correct?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So it is not quite --- well
22 I actually don't know what's been identified in the
23 deposition. The data are included in my --- in the
24 papers that I referenced that are what are convincing to

1 the medical community right now. The detailed
2 explanations for the specific biology are not known if
3 that's where you're going.

4 BY ATTORNEY TRYON:

5 Q. Assuming there is actually a biological
6 component, as you say, to gender identity, that says
7 nothing about whether a biological male identifying as a
8 female should, as a public policy matter, be allowed to
9 participate on a girls athletic team in high school and
10 middle school.

11 Right?

12 ATTORNEY BLOCK: Objection to form.

13 THE WITNESS: So the way that I would say
14 that is even if we recognize that there is a biological
15 explanation for gender identity, that does not --- well,
16 I don't know that then I can go on to make an expert
17 statement, honestly, because that gets outside my
18 purview and in terms of --- my lane is just simply to
19 say that.

20 BY ATTORNEY TRYON:

21 Q. Got it. Can you look at your rebuttal report
22 and look at page two?

23 A. I have my rebuttal in front of me and I'm on
24 page two.

1 Q. Paragraph 4B?

2 A. I have that in front of me.

3 Q. You say --- great. You say circulating
4 testosterone is the primary known biological driver of
5 average differences in athletic performance. Do you see
6 that?

7 A. I do.

8 Q. You say it is primary so what are the other
9 biological drivers of average differences in athletic
10 performance?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: So when I --- so we're
13 talking about circulating testosterone --- let me just
14 look at this. Right. The truth is, is that it may ---
15 that the only candidates that we have so far are
16 testosterone at puberty and testosterone in the moment.

17 BY ATTORNEY TRYON:

18 Q. So it's --- according to you, it's testosterone
19 at puberty and circulating testosterone are the only
20 biological drivers of average differences in athletic
21 performance.

22 Is that right?

23 A. So excuse me. I'm actually --- so this is the
24 president of the hospital.

1 ATTORNEY BLOCK: I'm sorry. Can we go
2 off the record for a minute and take a break. The
3 president of the hospital is returning his previous
4 call.

5 VIDEOGRAPHER: Going off the record. The
6 current time is 5:48 Eastern Standard Time.

7 OFF VIDEOTAPE

8 - - -

9 (WHEREUPON, A SHORT BREAK WAS TAKEN.)

10 - - -

11 ON VIDEOTAPE

12 VIDEOGRAPHER: Back on the record. The
13 current time reads 5:54 p.m. Eastern Standard Time.

14 BY ATTORNEY TRYON:

15 Q. My last question was according --- according to
16 you, testosterone at puberty and circulating
17 testosterone are the only biological drivers of average
18 differences in athletic performance.

19 Is that right?

20 A. Right, they are the only ones that are known.

21 Q. And in paragraph 4C, looking on page three ---
22 let's move over to page three, at the top of the page,
23 your statement is there is no basis to expect that
24 transgender girls who receive puberty delaying

1 medication followed by gender affirming hormones would
2 have an athletic advantage. There's a comma. But if we
3 just put a period there, is that your opinion?

4 A. That is correct. Yes, that is my opinion.

5 Q. Let me ask you the converse. You say there is
6 no basis to expect that transgender girls who receive
7 puberty delaying medication followed by gender affirming
8 hormones would not have an athletic advantage, period.
9 Would you agree with that statement?

10 A. No.

11 Q. Do you have any --- excuse me, any performance
12 data from an actual athletic event that support your
13 opinion?

14 A. I do not have any data from an actual athletic
15 performance study for that. No, I do not in that
16 context, in that specific instance.

17 Q. Let me ask you to look at your report. Turn to
18 paragraph 45.

19 A. So my report, paragraph 45. All right. I have
20 that in front of me.

21 Q. Great. Finally, unlike elite international
22 competition, schools and colleges often provide athletic
23 competition as part of a broader educational mission.
24 In that context, when scholastic athletics are

1 components of the educational process, institutions may
2 adopt policies designed to emphasize inclusion and to
3 provide the most athletic opportunities to the greatest
4 number of people. You see that.

5 Right?

6 A. I do.

7 Q. So these policies you referred to are designed
8 to emphasize inclusion and to provide the most athletic
9 opportunities to the greatest number of people, what's
10 the source of that policy? Did you come up with that or
11 did you see it someplace else?

12 ATTORNEY BLOCK: Objection to the form.

13 THE WITNESS: So the question is how am I
14 aware? Yeah --- I apologize. You can hear that I'm
15 confused on your question.

16 BY ATTORNEY TRYON:

17 Q. I'll try and do better. You said intuitions may
18 adopt policies designed to emphasize inclusion and to
19 provide the most athletic opportunities to embrace a
20 number of people. And those policies that you're saying
21 there, is that a policy that you read about somewhere or
22 something you are just suggesting? What's the source of
23 that?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: So an operative word in
2 this is may adopt policies, so this isn't referencing a
3 specific policy that I would give you right this moment,
4 if that's what you are asking.

5 BY ATTORNEY TRYON:

6 Q. So right, just aside from education --- this
7 whole paragraph is talking about education, but you're
8 not an expert on education or teaching methodology, are
9 you?

10 A. I certainly am not.

11 Q. And you don't have any degrees in education or
12 training in teaching methodology, do you?

13 A. I do not.

14 Q. And you have no degrees or training in pedagogy?

15 A. I have no degree in pedagogy. I will be careful
16 how absolutely I do not, because that's not my ---
17 that's not where I am representing myself to be an
18 expert. I am involved in some education, but at the
19 scholastic level not, so let's just say no.

20 Q. And you have no expertise as to whether sports
21 or how sports are used as part of educational systems.

22 Right.

23 A. Correct. That is not the expertise. The how
24 and my decisions among this are not my expertise.

1 Q. Do you have any idea how many schools actually
2 have sports programs?

3 ATTORNEY BLOCK: Objection. I couldn't
4 hear the full question. You cut out.

5 BY ATTORNEY TRYON:

6 Q. Sorry. Do you have any idea how many schools
7 have sports programs?

8 A. I could not give you a number, no.

9 Q. Are you aware that some colleges do not have
10 athletic programs?

11 A. I guess I'm vaguely aware. If you're asking me
12 as an expert than I wouldn't comment on that as an
13 expert, but as a human in society I certainly am aware
14 that that is a thing.

15 Q. Okay.

16 And do you have any idea what percentage of
17 kids are in athletic programs in schools versus those
18 that are not that are still students?

19 A. No, I would not be your source for that data
20 point.

21 Q. So when you are expressing this opinion in
22 paragraph 45 that's not an expert opinion there, is it?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: So right, I guess it's a

1 bit confusing here, because it's not my expert opinion
2 that --- well, I'm certainly aware as an individual that
3 this is a priority and when I sit on --- when I sit on
4 committees where we discuss relative priorities, there
5 are experts present who discuss these priorities. But
6 if I'm speaking to you as an expert, then I --- then I
7 can't be the representative expert in that space.

8 BY ATTORNEY TRYON:

9 Q. Right. Well, I'm just asking, in paragraph 45,
10 given your lack of expertise and education, you are not
11 giving an expert opinion in paragraph 45.

12 Is that a correct statement?

13 ATTORNEY BLOCK: Objection, asked and
14 answered.

15 THE WITNESS: So I'm simply --- I'm
16 raising all of the issues that we know exist, but then
17 I'm not providing an expert opinion in terms of the
18 relative priorities among these circumstances that
19 exist.

20 BY ATTORNEY TRYON:

21 Q. Let me just ask you very clearly is paragraph 45
22 an expert opinion of yours?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: I don't think I'm even

1 expressing an opinion in paragraph 45, expert or
2 otherwise. I'm simply stating the background situation.

3 BY ATTORNEY TRYON:

4 Q. Okay.

5 But --- okay. I would ask you to turn to
6 paragraph 37 of your report.

7 A. All right.

8 I have that in front of me.

9 Q. This is talking about the International Olympics
10 Committee. Right? Let me move back to paragraphs 35
11 and 36.

12 A. Yes, this is the International Olympic
13 Committee. This relates to the International Olympic
14 Committee.

15 Q. So this 2021 framework, do you believe that you
16 understand this framework?

17 A. I think you'll have to ask more specific
18 questions because I might understand parts and I might
19 have questions about parts.

20 Q. Very good. First of all, it says the 2021
21 framework further provides that, quote, any restrictions
22 arising from eligibility criteria should be based on
23 robust and peer-reviewed research that, A, demonstrates
24 a consistent, unfair, disproportionate competitive

1 advantage with performance and/or an unpreventable risk
2 to the physical safety of other athletes. You see that
3 part, right?

4 A. I do, yes.

5 Q. Do you understand what the word disproportionate
6 means in this context?

7 A. To a degree.

8 Q. Okay.

9 What do you understand it to mean when it says
10 a disproportionate competitive advantage in performance?

11 A. The IOC is aware that there's quite a wide range
12 of advantages with different body types and different
13 biology, and so they use language like disproportionate
14 when they want to talk about something that's --- that's
15 --- that's systematically associated with one
16 circumstance in a way that they think would violate the
17 rules, whatever they might be, for a specific sport.

18 Q. That's pretty ambiguous. I have no idea what
19 that means. Let me see if we can narrow it down. Is a
20 disproportionate competitive advantage in performance
21 --- would 20 percent be a disproportionate competitive
22 advantage?

23 ATTORNEY BLOCK: Objection to form.

24 THE WITNESS: So that's --- I can't

1 answer that, because it depends on context, and I'm not
2 the person who wrote the specific language in that
3 document, so that is the quote from the document. But
4 in terms of --- I don't --- I think we go someplace we
5 don't want to go if we try to over define the specific
6 word disproportionate.

7 BY ATTORNEY TRYON:

8 Q. So it's just not something that you or I could
9 look at and reach any kind of conclusion to tell them
10 what that means sitting here today.

11 Is that right?

12 A. I think if we look at a specific sport, I think
13 that if it was limited to just the two of us we might
14 need more expertise to make a decision.

15 Q. Well, let's say if we talked about the one mile
16 --- running one mile, is that something that we could
17 then determine what disproportionate competitive
18 advantage and performance would mean?

19 ATTORNEY BLOCK: Objection to form.

20 THE WITNESS: It would depend on context.
21 And if we're talking about at the elite level which is
22 what the IOC references and we limited --- even then if
23 we limit it just to you and to myself, we would want
24 more expertise.

1 BY ATTORNEY TRYON:

2 Q. Right. Okay.

3 So we don't know what the IOC meant by this in
4 any particular context do we?

5 ATTORNEY BLOCK: Objection to form.

6 ATTORNEY TRYON: Actually, let me redraw
7 this question.

8 BY ATTORNEY TRYON:

9 Q. You as an expert would not be able to give me an
10 expert opinion on what disproportionate competitive
11 advantage in performance of the one mile run would be;
12 right? You could not give me an expert opinion on that.

13 Fair statement?

14 A. If you break the words out in that --- in that
15 fashion then it does become difficult. If you ask me
16 what the entire statement after the letter A is
17 referencing, I can at least explain some of the thought
18 process for the IOC there.

19 Q. Well, my question is simply, you as an expert,
20 are you able to tell me what --- able to define for me
21 what would be a consistent, unfair disproportionate
22 competitive advantage in performance in a one mile run
23 for the IOC?

24 ATTORNEY BLOCK: Objection to form.

1 THE WITNESS: I, as an expert, cannot
2 give you a blanket explanation of what would
3 specifically consist of --- what would specifically meet
4 that definition. When they wrote the statement they
5 didn't actually even have specific guidance, that is
6 simply the spirit of a guideline --- the spirit of what
7 a specific guideline should consider when that guideline
8 is made.

9 BY ATTORNEY TRYON:

10 Q. Do you know what they meant when they said
11 unfair?

12 A. So the --- it's kind of the same circumstance.
13 That is the purpose of this statement is to be global
14 guidance for the experts in the specific sport when they
15 might develop guidelines relevant to their specific
16 sport. So for example, the group with expertise in that
17 one mile run that you're referencing should think in
18 this context. That's all this is doing.

19 Q. And some of the sporting organizations have come
20 up with some very specific rules.

21 Correct?

22 A. Some of the sporting federations have come up
23 with specific rules, yes.

24 Q. And as I recall, some of them require a certain

1 level of circulating testosterone.

2 Is that right?

3 A. Some of the sporting federations use a certain
4 level of circulating hormone as part or all of their
5 roles.

6 Q. And some of them use the level that you've
7 mentioned that you were involved in setting, which was 5
8 Nmol --- say it for me. Nmol something.

9 A. Nmol/Ls per liter. Yes, some of them use that
10 nmol/L per liter threshold.

11 Q. Did they --- where did they get that 5 nmol/L
12 quantity, do you know?

13 ATTORNEY BLOCK: Objection to form.

14 THE WITNESS: So I do know where that
15 number comes from originally for World Athletics, which
16 is the first one to put that number out. And that
17 number comes from studies of some Olympic athletes in
18 some races where there was for at least certain
19 distances a demonstrable difference between people who
20 had --- and specifically people in the female category
21 who had lower numbers of testosterone than that and
22 higher numbers of testosterone than that.

23 BY ATTORNEY TRYON:

24 Q. You were on that committee.

1 Right?

2 A. I was on the group that wrote that World
3 Athletics policy, yes. Not on the group that did that
4 study.

5 Q. And so how did you finally come up with the
6 number of five as opposed to four or six or three or
7 seven?

8 A. The number five discriminates in terms --- in
9 terms of there being some demonstrated advantage or
10 improved outcome is really what it was, for those with
11 higher numbers versus those with lower numbers. That
12 was not true necessarily with a lower testosterone
13 threshold. That is a difference was not as apparent and
14 that's really the entire logic pattern there.

15 Q. Well, earlier you just said it could have been
16 --- you didn't think there was that much difference
17 between five and six. That was your testimony earlier
18 as I recall.

19 Right?

20 ATTORNEY BLOCK: Objection.

21 THE WITNESS: As an endocrinologist I can
22 tell you that those difference --- that that's right
23 that to --- the difference between five and six would be
24 hard to demonstrate.

1 BY ATTORNEY TRYON:

2 Q. So how did you settle on five instead of six or
3 five or six instead of four?

4 A. So I guess the inputs are that there needed to
5 be a line so that there's ability to enforce something.
6 There needed to be a rule. And the choice of five,
7 mostly, is what I've been saying already, which is ---
8 it's a clean number where there's at least some
9 distances, there's a demonstrable difference in outcomes
10 at that level --- above and below that level.

11 Q. So are you saying that there is a value of
12 having a hard rule?

13 ATTORNEY BLOCK: Objection to form.

14 BY ATTORNEY TRYON:

15 Q. Maybe I should say having a clean rule?

16 A. So as an expert I'm not --- that wasn't my role
17 on the committee to determine that there needed to be a
18 rule, but that is certainly the logic pattern of the
19 committee that there ought to be a rule. That is not my
20 expert opinion.

21 Q. Okay.

22 But different organizations are free to come up
23 with different conclusions of about what their rules
24 ought to be.

1 Right?

2 ATTORNEY BLOCK: Objection to form.

3 THE WITNESS: So the different
4 International Athletic Federations were to make use of
5 data such as it exists to make their own rules for
6 participation in their sports.

7 BY ATTORNEY TRYON:

8 Q. And different organizations came up with very
9 different rules.

10 Right?

11 ATTORNEY BLOCK: Objection to form.

12 THE WITNESS: So most of the
13 international federations still do not have rules,
14 actually. And honestly, that's mostly a logistics
15 situation where some of these organizations are too
16 small to put the data together or the committees
17 together to make rules.

18 BY ATTORNEY TRYON:

19 Q. Those that do have rules have different rules.

20 Correct?

21 A. Those that do have rules have had different
22 conversations in the space. I don't know that I could
23 systematically go through all of them, but there is some
24 variation, yes.

1 Q. Some require --- have a Level 5 nanomoles per
2 liter and some still have ten.

3 Right?

4 A. So I'd have to go back and look. You would have
5 to show me. World Athletics has five for sure. And
6 that's the one where I'm most familiar because I was
7 actually sitting in the room helping draft that. The
8 IOC in the past had used ten as a line, but that just
9 sits there right now as a --- as a number someone might
10 adopt. I actually don't know off the top of my head if
11 anybody has adopted that for their formal rules.

12 Q. What was the scientific basis for the ten
13 nanomoles per liter?

14 A. The logic for ten at the time is it is the
15 bottom of the male range. That's its history.

16 Q. Okay.

17 So it sounds to me like there is room for
18 reasonable discussion about what the appropriate rule
19 ought to be?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: The way I would say it is
22 as different athletic organizations obtain data, they
23 might use those data to determine differences, including
24 if the --- if our best measure is testosterone,

1 different thresholds of testosterone.

2 BY ATTORNEY TRYON:

3 Q. Would it be appropriate to use performance data
4 as well to make those decisions?

5 A. The best data in my opinion are actual outcomes
6 within a given sport.

7 Q. What do you mean by outcomes, performance? Are
8 we saying the same thing?

9 A. I don't know if we're saying the same thing. So
10 the studies that I reference are the Roberts study and
11 the Harper study, where they actually look at specific
12 athletic endeavors and measure those as opposed to the
13 studies where they're simply sitting in a physiology lab
14 measuring somebody move an arm back and forth and
15 thinking that it might associate with some actual
16 athletic performance.

17 Q. Somebody moving their arm back and forth with
18 weights, that's not athletic?

19 A. It's --- again, it would --- right, that's ---
20 that's only --- that's what we would call a surrogate
21 endpoint where you are simply looking at something that
22 might correlate with what you want, but --- but you
23 don't know it until you test it. It ends up being what
24 we call hypothesis generating. That is how we would say

1 it in a scientific way.

2 Q. And the same would hold true with the level of
3 circulating testosterone, you would want to actually
4 test that in real life to see how people's circulating
5 testosterone actually translates into performance of an
6 actual athletic contest.

7 Right?

8 A. That's right. So the data that were used to
9 determine the five nanomole per liter cut point are
10 passively collected data. And if somebody did a study
11 looking at that threshold and found that there was,
12 let's say, no difference, then that rule might be
13 discarded.

14 Q. And so far, other than Roberts and Harper, if I
15 recall correctly, those are the only two that you know
16 of.

17 Right?

18 ATTORNEY BLOCK: Objection to form.

19 THE WITNESS: Those are the only two
20 studies that have gone that extra step and looked at an
21 actual athletic activity with an outcome that is part of
22 that athletic activity and not what I was just
23 referencing, as a surrogate endpoint.

24 BY ATTORNEY TRYON:

1 Q. In those two studies did they check the
2 circulating testosterone in the individuals in these
3 studies?

4 A. I'd have to look. I think we did look earlier
5 today with regard to the Harper study, and I don't think
6 she's referencing testosterone levels at all. Again,
7 I'd have to go back and look to be sure. We were
8 talking about whether they were self-reported. And the
9 --- with the Robert study I would have to go back and
10 look at that one, too. I'm feeling like the answer is
11 no, but we can look there if you want.

12 Q. Yeah, we don't need to. I'm pretty sure that we
13 just talked about how long they had been in the therapy
14 rather than actual measurements.

15 Well, let me move on. I know we don't have a
16 lot of time left.

17 So you said you're familiar in your expert
18 report you are familiar with HB-3293.

19 Is that right?

20 ATTORNEY BLOCK: Objection to form.

21 THE WITNESS: So yes, I'm somewhat
22 familiar.

23 BY ATTORNEY TRYON:

24 Q. Have you read the whole thing?

1 A. I don't think I've read the whole thing, no.

2 Q. When did you first hear of HB-3293?

3 A. I probably first heard of it when the --- when I
4 received contact from the ACLU to serve as an expert
5 witness.

6 Q. Do you recall if that was before or after it was
7 passed?

8 A. I don't recall. I would have to speculate that
9 it would be after, because that would --- I mean that
10 would make sense that that is true, but I don't recall,
11 so I wouldn't be able to answer that.

12 Q. Okay.

13 So we would refer to this as State Women's
14 Sports Law and there's other types of laws like this
15 throughout the country.

16 Are you aware of that?

17 ATTORNEY BLOCK: Objection to form.

18 THE WITNESS: So I'm aware that there are
19 attempts at legislation and some actual legislation
20 passed to block transgender athletes in various
21 permeations, including transgender women in several
22 states. I'm aware of that, yes.

23 BY ATTORNEY TRYON:

24 Q. Are you aware then House Bill 3293 the word

1 transgender does not appear at all?

2 A. House Bill --- that's this one?

3 Q. That is this one.

4 A. I was not aware that the word transgender does
5 not appear at all.

6 Q. Are you tracking the other bills out there that
7 are similar to House Bill 3293?

8 A. I am not personally tracking the other bills,
9 no.

10 Q. Can you take a look at the Handelsman report
11 that you have in front of you. I don't recall the
12 exhibit number.

13 ATTORNEY WILKINSON: I think Exhibit 13
14 --- oh, sorry, it's Exhibit 4, I think.

15 THE WITNESS: I don't see.

16 ATTORNEY WILKINSON: I can give you that.

17 THE WITNESS: The stack got big.

18 ATTORNEY TRYON: We can just bring it ---
19 if you can't find it we can bring it up on the screen?

20 THE WITNESS: Okay.

21 I was given another copy, so we're good.
22 I have it in front of me.

23 BY ATTORNEY TRYON:

24 Q. Okay.

1 On the second page?

2 A. On the second page.

3 Q. Okay.

4 Under fairness and segregation in sports.

5 Do you see that section?

6 A. I do.

7 Q. In the third full paragraph underneath there ---
8 oh the formatting there is a little different than the
9 copy that I have. Let's see. There's a paragraph that
10 starts the terms sex and gender. There it is. The
11 terms sex and gender are often confused as
12 interchangeable. Now, I want you to focus on this next
13 sentence. Sex is an objective specific biological
14 state, a term with distinct fixed facets notably
15 genetic, chromosomal, gonadal, hormonal and phenotypic
16 including genital sex, each of which has a
17 characteristic defined binary form. Did I read that
18 correctly?

19 A. You read that correctly, yes.

20 Q. Do you agree with that statement?

21 A. I don't agree with that statement completely,
22 no.

23 Q. What specifically do you find objectionable.

24 A. It's missing some components of sex, including,

1 for example gender identity. And the phrasing
2 characteristic defined binary form is not necessarily
3 true for each component of biological sex.

4 Q. So you disagree with the statement in the
5 Handelsman report, is that --- did I state that fairly?

6 A. Right. I would characterize the statement as
7 not exhaustive.

8 ATTORNEY TRYON: Let me ask the court
9 reporter if I have any time.

10 COURT REPORTER: I have six minutes and
11 58 --- six hours and 58 minutes.

12 ATTORNEY TRYON: Well, I guess with my
13 last two minutes I'll just say thank you for your time
14 and I appreciate it. And I don't have any other
15 questions. I don't know if any of the other Defendants
16 do. I doubt it. But go ahead. If they do, go ahead.
17 Kelly?

18 ATTORNEY MORGAN: This is Kelly Morgan.
19 I don't have any questions. Thank you so much.

20 ATTORNEY TRYON: Roberta? Susan, you're
21 next.

22 ATTORNEY GREEN: This is Roberta Green on
23 the behalf of the SSAC. No questions. Thank you.

24 ATTORNEY DENIKER: Dr. Safer, this is

1 Susan Deniker. I have no questions. Thank you for your
2 time today.

3 ATTORNEY TRYON: We are finished.

4 VIDEOGRAPHER: This concludes this
5 deposition. The current time reads 6:31 p.m. Eastern
6 Standard Time.

7 * * * * *

8 VIDEOTAPED DEPOSITION CONCLUDED AT 6:31 P.M.

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1 STATE OF WEST VIRGINIA)

2 CERTIFICATE

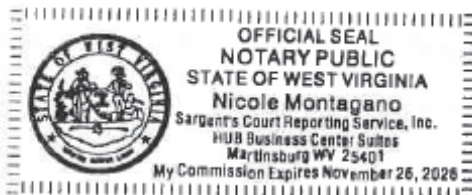
3 I, Nicole Montagano, a Notary Public in
4 and for the State of West Virginia, do hereby
5 certify:

6 That the witness whose testimony appears
7 in the foregoing deposition, was duly sworn by me
8 on said date, and that the transcribed deposition
9 of said witness is a true record of the testimony
10 given by said witness;

11 That the proceeding is herein recorded
12 fully and accurately;

13 That I am neither attorney nor counsel
14 for, nor related to any of the parties to the
15 action in which these depositions were taken, and
16 further that I am not a relative of any attorney
17 or counsel employed by the parties hereto, or
18 financially interested in this action.

19 I certify that the attached transcript
20 meets the requirements set forth within article
21 twenty-seven, chapter forty-seven of the West
22 Virginia.



Nicole Montagano
Nicole Montagano,
Court Reporter

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA
CHARLESTON DIVISION

B.P.J. by her next friend and mother, HEATHER JACKSON,

Plaintiff,

v.

WEST VIRGINIA STATE BOARD OF EDUCATION, HARRISON COUNTY BOARD OF EDUCATION, WEST VIRGINIA SECONDARY SCHOOL ACTIVITIES COMMISSION, W. CLAYTON BURCH in his official capacity as State Superintendent, DORA STUTLER in her official capacity as Harrison County Superintendent, and THE STATE OF WEST VIRGINIA,

Defendants,

and

LAINIEY ARMISTEAD,

Defendant-Intervenor.

Civil Action No. 2:21-cv-00316

Hon. Joseph R. Goodwin

EXPERT REPORT AND DECLARATION OF PROFESSOR MARY D. FRY, PHD

1. I have been retained by counsel for Plaintiff as an expert in connection with the above-captioned litigation.

2. The purpose of this expert report and declaration is to offer my expert opinion on: (1) the psychological and behavioral benefits of sports for youth and young adults (including collegiate athletes); and (2) the conditions that lend themselves to youth and young adults participating in athletics and accessing those benefits when they do participate.

3. I have knowledge of the matters stated in this expert report and declaration. I have collected and cite to relevant literature concerning the issues that arise in this litigation in the body of this expert report and declaration and in the attached bibliography.

4. In preparing this expert report and declaration, I reviewed West Virginia H.B. 3293, the bill at issue in this litigation.

5. In preparing this expert report and declaration, I relied on my education and training, my professional and research experience, and my knowledge of the literature in the pertinent fields. The materials I have relied upon in preparing this expert report and declaration are the same types of materials that experts in my field of study regularly rely upon when forming opinions on the subject. I may wish to supplement these opinions or the bases for them as a result of new research or publications or in response to statements and issues that may arise in my area of expertise.

PROFESSIONAL BACKGROUND

6. I am a Professor in the Department of Health, Sport & Exercise Sciences at the University of Kansas in Lawrence, Kansas. A true and correct copy of my Curriculum Vitae is attached hereto as Exhibit A.

7. In 1984, I graduated from Texas Wesleyan University in Fort Worth, Texas with a Bachelor of Science in Physical Education. After graduating, I spent about five years teaching physical education and coaching tennis at schools and summer camps in Texas and North Carolina.

8. I graduated with a Master of Science in Sport Psychology/Pedagogy from the University of North Carolina in Greensboro, North Carolina in 1990. Then, in 1994, I graduated with a doctorate in Sport & Exercise Psychology from Purdue University in West Lafayette, Indiana. From 1994 to 1999, I served as an Assistant Professor in the University of Memphis's

Department of Human Movement Sciences and Education. I continued at the same institution from 1999 to 2007 as an Associate Professor in the Department of Human & Sport Sciences. I joined the faculty of the University of Kansas in 2007, where I continue to teach and research as a Professor today.

9. I have authored or coauthored 69 papers in peer-reviewed journals, including many studies in sport psychology and youth athlete motivation. I have coauthored seven book chapters and one book, titled *A Coach's Guide to Maximizing the Youth Sport Experience: Work Hard and Be Kind*. I have also given 118 presentations on my research at both international and national conferences, as well as dozens of local and regional presentations.

10. I have taught and/or developed six undergraduate level courses and 12 graduate level courses in sport and exercise psychology. The courses I developed include Psychosocial Aspects of Sport, Applied Sport Psychology, Developmental Perspectives in Youth Sport, and Special Course: Sport Psychology Within Youth Sport.

11. On a national level, I have served with the Association of Applied Sport Psychology ("AASP") as a member of the Program Review Committee (2008-present), a Subject Matter Expert for the Certification Exam Committee (2018), and a member of the Ad-Hoc Future of AASP Committee (2012-2015). For the AASP, I have served as an Executive Board Member (2004-2006), two three-year terms as a member of the Social Psychology Section Committee (1996-99; 2001-2003), and as a member of the Dissertation Award Committee (1998; 2002). I have also served on the Editorial Board for *Physical Activity Today* (1997-2001) and on the Program Review Committee for the American Alliance of Health, Physical Education, Recreation & Dance (2009-2017), in addition to chairing the Committee in 2010. I also serve on the National Advisory Board for the Positive Coaching Alliance.

12. I have undertaken editorial roles on professional journals within my field, including as Associate Editor (2009-2012) and Editorial Board Member (2000-2009; 2013-present) for the *Journal of Applied Sport Psychology*; Associate Editor (2008-present) for the *Journal of Sport Psychology in Action*; Section Editor (2003-2006) and Reviewer (1994-present) for the *Research Quarterly for Exercise and Sport*; and Editorial Board Member (2011-present) for *Sport, Exercise, and Performance Psychology*.

13. I have served on the Kansas University Certificate in Sport Committee (2017-2018), and the Kansas University Center for Undergraduate Research, Advisory Board (2016-2018), among other roles at the University.

14. I am, or have been, a member of several professional organizations, including the American Psychological Association (2017-present), the Kansas Alliance for Health, Physical Education, Recreation, & Dance (2008-present), the American Alliance for Health, Physical Education, Recreation, and Dance (1988-2017), and the North American Society for the Psychology of Sport and Physical Activity (1988-2000).

15. I also have experience applying sport psychology in the field, which include mental skills interventions for various athletes and teams, including with high school and university athletes (2000-present), a high school baseball team (2013-2018), a youth baseball team (2009-2011), a Division I collegiate volleyball team (2008-2010), a high school basketball team (2006-2007), and a Division I cross-country team (2006).

16. I have not previously testified as an expert witness in either deposition or at trial.

17. I am being compensated at an hourly rate of \$250 per hour. My compensation does not depend on the outcome of this litigation, the opinions I express, or the testimony I provide.

**FOCUSING SOLELY ON PERFORMANCE OUTCOMES UNDERMINES THE
BENEFITS OF SPORT FOR YOUTH AND YOUNG ADULT ATHLETES**

18. For youth and young adult student-athletes, athletics serve a different purpose than for athletes who participate in professional athletics or world elite competition. A myopic focus on winning in youth and young adult athletics ignores the other important benefits that school athletics offer young athletes, such as teamwork and camaraderie, which are advanced when all athletes have the opportunity to play the sport they love and reap the benefits of such participation.

19. The National Collegiate Athletic Association (NCAA) estimates that there are eight million high school student-athletes in the United States.¹ Of those millions of athletes, only about 6% go on to compete at the college level in any division (with only about 2% earning an athletic scholarship).² By the numbers alone, the primary purpose of high school sports is not about preparing youth for college sports. For the 93% of high school athletes who do not compete in college as well as for those who do, youth sport creates a myriad of benefits unrelated to preparing athletes to compete in college.

20. Then for collegiate athletics, most athletes do not go on to have athletic careers beyond college in an elite sports context. According to the NCAA: “Fewer than two percent of NCAA student-athletes go on to be professional athletes.”³ That percentage does not include National Association of Intercollegiate Athletics (for small college sports) and junior college student-athletes, who are less likely to have professional sports careers. Accordingly, among total numbers of collegiate athletes in the United States, the total percentage of athletes who go on to participate in elite, professional athletics after college is even lower than two percent.

¹ <https://www.ncaa.org/about/resources/research/estimated-probability-competing-college-athletics>

² *Id.*; <https://www.ncaa.org/student-athletes/future/scholarships>

³ <https://www.nfhs.org/media/886012/recruiting-fact-sheet-web.pdf>

21. There are many benefits to young people from participating in athletic activities, discussed further herein. But understanding what motivates youth and young adults to participate in athletics in the first place is essential for understanding how they can access these benefits. One critical way to increase participation in athletics is to understand the factors that motivate individuals to stay engaged at different ages and in different contexts. Understanding motivation also helps to explain how the benefits youth and young adults derive from participating in sport translate to other aspects of their lives.

22. In simple terms, motivation is the desire to do activities. More formally, it is defined as “the process that influences initiation, direction, magnitude, perseverance, continuation, and quality of goal-directed behavior” (Maehr & Zusho, 2009). Motivation is about why, how, when, and in what circumstances people employ their resources.

23. One of the most-researched motivational theories in the field of sport psychology is achievement goal perspective theory, which was developed to address how motivation could be heightened and sustained over time (Nicholls 1984, 1989). Achievement goal perspective theory includes three components that together can work to optimize motivation among all individuals, including youth and young adults participating in sports.

24. First is the developmental component of achievement goal perspective theory. Young children are incapable of accurately comparing their ability to others, overestimate their ability, and are naturally focused on their effort as a marker of success. By the time they enter adolescence, however, they are able to distinguish the concepts of effort, luck, and ability.

25. Second, around 12 years of age, children achieve a mature understanding of the concept of ability and at that time adopt their own personal definitions of success, or “goal orientations.” The primary goal orientations are task and ego. Individuals with a “high task

orientation” define success based on their effort, improvement, and mastery of tasks over time. In contrast, a high ego orientation occurs when individuals define success in normative terms, only feeling successful when they outperform others. Individuals are to some degree both task- and ego-oriented; in fact, they can be high and/or low in both orientations.

26. Third, motivations are shaped by outside factors, which can reinforce a task orientation as opposed to an ego orientation. Specifically, athletes can perceive the environment that is created by coaches (but can also be influenced by parents and teammates) (Ames, 1992a, 1992b; Nicholls, 1984, 1989) as a task-involving or ego-involving climate. When the environment created by coaches and others is a caring environment, athletes are more likely to perceive the overall climate as task-involving. A caring environment is one where athletes feel safe, welcome, comfortable, and valued, and are treated with kindness and respect by all in the sport setting (Newton et al., 2007). A climate that is both task-involving and caring is one in which coaches do the following: recognize and reward effort and improvement; foster cooperation among teammates; make everyone feel they play an important role on the team; treat mistakes as part of the learning process; and encourage an atmosphere where everyone is treated with mutual kindness and respect.

27. A high task orientation, described above in Paragraph 25 is the key to optimizing motivation over time because effort and improvement – the keys to task orientation – are variables that individuals can more easily control. High task orientation results in athletes being more likely to seek challenge, exert high effort, and persist over time (Machr & Zusho, 2009).

28. Perhaps the strongest finding within the goal orientation research links task orientation with high enjoyment. Throughout childhood and adolescence, and across a range of sports, athletes who define success based on their personal effort and improvement have more fun

playing their sport than those high in ego orientation (Schneider, Harrington, & Tobar, 2017; Seifriz, Duda, & Chi, 1992; Stephens, 1998; Stuntz & Weiss, 2009; van de Pol & Kavussanu, 2011). Importantly, goal orientations are also associated with the sources of enjoyment athletes identify. For example, youth athletes with a high task orientation more often report experiencing enjoyment from learning and having positive team interactions. In contrast, athletes high in ego orientation more often report experiencing enjoyment as a result of winning and having high perceived competence (Lochbaum & Roberts, 1993).

29. Another benefit of high task orientation in youth athletes is the strong and positive association with interpersonal and team dynamics (Balaguer, Duda, & Crespo, 1999; Ommundsen, Roberts, Lemyre, & Miller, 2005). Task orientation is positively correlated with peer acceptance, less conflict with peers, and greater satisfaction with the coach.

30. Athletes high in task orientation also report greater confidence and perceived ability, and task orientation has been correlated with both self and team efficacy and greater perceived competence (Magyar & Feltz, 2003; Seifriz et al., 1992; Stuntz & Weiss, 2009). Further, athletes high in task orientation report utilizing more adaptive coping strategies (Kim, Duda, & Gano-Overway, 2011; McCarthy, 2011). These adaptive outcomes have been found for middle school, high school, and collegiate athletes.

31. By contrast, ego orientation (i.e., the non-pejorative, descriptive term for defining success based on ability and performance outcomes), is not correlated with perceived ability in general. Confidence of athletes high in ego orientation was more often based on their perceptions of ability and having a strong physical presence, whereas athletes high in task orientation based their perceptions of confidence on their sense of feeling well prepared and mentally strong (Magyar and Feltz, 2003).

32. Athletes high in ego orientation report lower companionship and greater conflict with teammates (Balaguer et al., 1999), and there is no evidence to suggest they reap the benefits of enhanced social relationships that athletes with high task orientation do (Ommundsen et al., 2005). Despite the ego-involving climate's emphasis on performance outcomes, results across studies suggest that the benefits of a task-involving climate may have a direct impact on athletic performance and ultimately improve performance outcomes (Jackson & Roberts, 1992; McDonald, Cote, & Deakin, 2011). By contrast, no evidence currently points to an ego-involving climate leading to greater performance outcomes with young athletes.

33. There is also a consistently significant relationship between ego orientation and anxiety (Lochbaum et al., 2016). Young athletes with high ego orientation participating in a variety of sports have reported higher trait and state cognitive and somatic anxiety, as well as greater concentration disruption, maladaptive perfectionism, and concern over making mistakes (Grossbard, Cumming, Standage, Smith, & Smoll, 2007; Hall, Kerr, & Matthews, 1998; Ommundsen & Pedersen, 1999; Ommundsen et al., 2005; White & Zellner, 1996).

34. Even for athletes who are themselves highly ego-oriented, and who prioritize winning and external rewards, a task-involving and caring climate is preferable. Such a climate encourages young athletes to orient themselves toward a task-involved model for motivation and away from the stress-inducing ego-orientation, which will in turn garner the young person the benefits associated with a task-orientation. For example, Division I college athletes who perceived a task-involving climate on their teams reported having stronger mental skills including their use of goal setting, ability to concentrate, remain worry free, cope with adversity and peak under pressure, act with confidence, and be open to receiving feedback from coaches (Fry, Iwasaki, & Hogue, 2021). These findings would suggest that athletes with strong mental skills might also

perform better. Further, perceptions of an ego-involving climate have been linked to higher salivary cortisol responses (Hogue, Fry, & Fry, 2017). Cortisol is an important and necessary hormone, but in excess it can break down muscle tissue and interfere with the immune system.

35. Thus, the benefits associated with youth and young adult sport are not limited to whether athletes are winning competitions, where they are ranked in their sport, or what level of publicity they are getting. In fact, a focus exclusively on those things not only undermines an athlete's success in those areas but can compromise the holistic range of benefits derived from youth and young adult sport. Ultimately, athletes are more likely to reap the positive benefits associated with youth and young adult sports if they are task-involved, which places greater emphasis on effort, than if they are ego-involved, which would put greater emphasis on trappings of individual success.

36. It should be noted that the research findings described above, which highlight the relationships between goal orientations and numerous outcome variables, have been consistent for both boys and girls. In other words, within the body of research on athletes' goal orientations, results across studies reveal that task orientation is more often positively correlated with adaptive outcomes (e.g., intrinsic motivation), and ego orientation is more often negatively associated with maladaptive outcomes (e.g., worry) for both boys and girls (Fry & Moore, 2019; Roberts, 2012; Roberts, Nerstad, & Lemyre, 2018).

**EXCLUDING TRANSGENDER STUDENTS FROM PARTICIPATING IN
YOUTH AND YOUNG ADULT ATHLETICS WOULD DEPRIVE THEM AND THEIR
TEAMMATES OF A WIDE RANGE OF BENEFITS**

37. A goal of youth sport is to help young athletes have positive experiences across sport. This includes creating space for athletes to have fun, develop skills, make friends, increase their levels of physical activity, continue their participation over time, and learn valuable life

lessons (Thompson, 2010). If transgender students are arbitrarily excluded from youth sports, they are, in turn, deprived of those positive experiences and outcomes and their teammates are deprived of a genuinely optimal sport experience.

38. Athletes who participate in high school sport are more likely to finish college, and more likely to be actively engaged in planning for their future after their sport career ends (Chamberlin & Fry, 2020; Troutman & Defur, 2007). Many of the benefits to youth who participate in athletics are documented throughout life. For example, women who participated in high school sport see greater success in the business world (ESPNW & EY, 2017; Sasaki, 2020). When athletes are excluded from participating in sport, or are in a climate where they do not feel accepted or respected, they do not have the opportunity to reap these benefits.

39. In addition, arbitrarily excluding transgender students from teams undermines a task-involving climate, which, in turn, diminishes the positive outcomes for all youth and collegiate athletes. (Balaguer, Duda, & Crespo, 1999; Ommundsen, Roberts, Lemyre, & Miller, 2005). Fostering task orientation positively correlates with peer acceptance, less conflict with peers, and greater satisfaction with the coach. These outcomes help athletes have a sport experience that make them want to keep playing sport. Because these positive benefits are fostered in a task-involving environment, arbitrary exclusions can cause harm not only to the athletes who are excluded, but also to the other athletes on the team.

40. When a team, league, or organization adopts an ego-promoting philosophy, and cares only about performance outcomes, the broader benefits of sport are diminished for all involved (both with regard to their future athletic careers and lives outside of sport). As noted above, the overwhelming majority of high school athletes will never go on to compete in college, and the overwhelming majority of college athletes will never go on to compete on professional

teams. Focusing only on the highest-performing athletes or post-graduate elite athletics compromises the other critical benefits of sports for youth and young adults.

41. The climate of youth sport must be geared to include all participants, so that teams are more likely to help every athlete maximize their potential. From an educational perspective, it is optimal to encourage all athletes to do the best that they can, and to help all athletes enjoy the sport that they love.

42. For coaches of youth and young adult athletes, one important message is that, for the overwhelming majority of people, the period of time that a person participates in organized athletics is short and maximizing the benefits of that participation is essential. As Jim Thompson, Founder and former-CEO of the Positive Coaching Alliance notes: “Here’s the bottom line for parents. Your child’s experience with youth sports will come to an end, and it may happen suddenly. If you are like me, you will look back and think, ‘I wish I had enjoyed it more. I wish I hadn’t obsessed so much about how well my child was performing, or the team’s record, or whether he or she was playing as much as I wanted, or why the coach didn’t play him or her in the right position. I wish I had just enjoyed the experience more.’ Because the youth sports experience is so intense, we tend to forget how short it is and what a small amount of time parents and children get to spend together over the course of life.”

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: January 24, 2022



Professor Mary D. Fry, PhD

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EXHIBIT A

CURRICULUM VITAE

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DEPARTMENT: Health, Sport & Exercise Sciences
RANK: Professor

DEPARTMENT ADDRESS:

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 University of Kansas
 Lawrence, KS 66045
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EDUCATION

DEGREE	DISCIPLINE	INSTITUTION	YEAR
BS	Physical Education	Texas Wesleyan University	1984
MS	Sport Psychology/Pedagogy	University of North Carolina- Greensboro	1990
PhD	Sport & Exercise Psychology	Purdue University	1994

EXPERIENCE

RANK/POSITION PERIOD	DEPARTMENT/DIVISION	INSTITUTION/ORG.
Professor	Health, Sport & Exercise Sci	University of Kansas 2019
Associate Professor	Health, Sport & Exercise Sci	University of Kansas 2007-2019
Associate Professor	Human & Sport Sciences	University of Memphis 1999-2007
Assistant Professor	Human Movement Sciences & Education	University of Memphis 1994-1999
Editorial Assistant	Journal of Applied Sport Psychology	1992-1994
Associate Investigator	Indiana Youth Risk Behavior	Indiana Dept. of Education/Centers 1992
		Study for Disease Control
Research Consultant	Grant to Study Youth Sports	National Institute for Fitness & Sport 1991
		Indianapolis, IN
Teaching Assistant	Health, Kinesiology & Leisure Studies	Purdue University 1990-1992
Teaching Assistant	Sport & Exercise Science	U. North Carolina-Greensboro 1989-1990

RANK/POSITION	DEPARTMENT/DIVISION.	INSTITUTION/ORG.	PERIOD
Middle School Teacher	Physical Education	Allen Middle School Greensboro, NC	1988-89
High School Teacher	Physical Education/English & Head Tennis Coach	Martin High School Arlington, TX	1987- 88
High School Teacher	Physical Education/English & Head Tennis Coach	Richland High School Fort Worth, TX	1984-87
Instructor	University of Texas-Austin	Summer Tennis Camps	1988 & 1989

Certification. Secondary Teacher Certification in English and Physical Education in the State of Texas, 1984.

HONORS/AWARDS:

Coleman Griffith Lecture, Association of Applied Sport Psychology (2021)
 Del Shankel Teaching Excellence Award (Recipient 2021; Finalist 2018, 2019)
 Budig Teaching Professorship, University of Kansas (2018)
 Outstanding Mentor, McNair Scholars Program (2017)
 KU Woman of Distinction, (2014-2015)
 Joyce Elaine Pauls Morgan HSES Teaching Award (2013)
 Budig Teaching Professorship, Nominee (2012)
 Bird Outstanding Mentor Award, Nominee (2011)
 Service Award, School of Education, University of Kansas, Nominee (2011)
 KU Keeler Professorship, University of Kansas (2010).
 Fellow, Association of Applied Sport Psychology (2009).
 Outstanding Research Article published in *Research Quarterly for Exercise & Sport* (1997).
 Presented by the Research Consortium of the American Alliance of Health, Physical Education, Recreation, & Dance.
 Outstanding Doctoral Dissertation, North American Society for the Psychology of Physical Activity (1994).
 Student Representative, CIC Big Ten Conference "Capstone of Knowledge" hosted by Michigan University, December, 1992.

RESEARCH PUBLICATIONS

Refereed Journal Publications

Easton, L., **Fry, M. D.** Hogue, C. M., & Iwasaki, S. (in press). Goal orientations predict exercisers' effort and enjoyment while engaged in exercise and reasons for using a fitness tracker. *Acta Facultatis Educationis Physicae Universitatis Comenianae*.
Fry, M. D., Iwasaki, S., & Hogue, C. M. (in press). The relationship between the perceived motivational climate in elite collegiate sport and athlete psychological coping skills. *Journal of Clinical Sport Psychology*.
 Hogue, C. M., **Fry, M. D.**, & Fry, A. C. (in press). The protective impact of learning to juggle in a caring, task-involving climate versus and ego-involving climate on participants' inflammation, cortisol, and psychological responses. *International Journal of Sport and Exercise Psychology*.
 Iwasaki, S., **Fry, M. D.**, & Hogue, C.M. (in press). The relationship among male high school athletes' perceptions of the motivational climate, mindful engagement, and coachability. *Journal of Clinical Sport Psychology*.
 Scott, C., **Fry, M.D.**, Wineinger, T., & Iwasaki, S., & Fry, M. D. (in press). Creating an optimal motivational team climate to help collegiate athletes thrive during the COVID-19 pandemic. *Journal of Sport Psychology in Action*.
 Scott, C., **Fry, M. D.**, Weingartner, H., & Wineinger, T. (in press). Collegiate sport club athletes' psychological well-being and perceptions of their team climate. *Recreational Sports Journal*.

- Wineinger, T., **Fry, M. D.**, & Moore, E. W. (2021). Validation of climate and motivational measures for use in the biology laboratory setting. *Journal of Biological Education*.
- Brown, T. C., **Fry, M. D.**, Breske, M., Iwasaki, S., & Wilkinson, T. (2019). Motivational climate and athletes' likelihood of reporting concussions in a youth competitive soccer league. *Journal of Sport Behavior*, 42(1), 29-47.
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- Miller, S., & **Fry, M. D.** (2018). Relationship between climate to body esteem and social physique anxiety within college physical activity classes. *Journal of Clinical Sport Psychology*, 12, 525-543.
- Wineinger, T. O. & **Fry, M. D.** (2018). The power of a caring/task-involving climate to help students find their life's passion. *Kansas Association for Health, Physical Education, Recreation, & Dance Journal*, 90 (1), 49-56.
- Breske, M. P., **Fry, M. D.**, Fry, A. C., & Hogue, C. M. (2017). The effects of goal priming on cortisol responses in an ego-involving climate. *Psychology of Sport and Exercise*, 32, 74-82.
- Brown, T. C., **Fry, M. D.**, & Moore, E. W. G. (2017). A motivational climate intervention and exercise-related outcomes: A longitudinal perspective. *Motivation Science*, 3, 337-353
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- Fontana, M. S., & **Fry, M. D.** (2017). Creating and validating the shame in sport questionnaire. *Journal of Sport Behavior*, 40, 278-296.
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- Moore, E. W., G., & **Fry, M. D.** (2017). National franchise members' perceptions of the exercise psychosocial environment, ownership, and satisfaction. *Sport, Exercise, & Performance Psychology*, 6, 188-198.
- Moore, E. G. W., & **Fry, M. D.** (2017). Physical education students' ownership, empowerment, and satisfaction with PE and physical activity. *Research Quarterly for Exercise and Sport*, 88, 468-478. <https://doi.org/10.1080/02701367.2017.1372557>
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- Fontana, M., Bass, J., & Fry, M. D. (2015). From Smith Center to Coney Island: Examining the coaching climate in the United States sporting culture. *Journal of Contemporary Athletics*, 9, 211-226.
- Fry, M. D., & Brown, T. C. (2015). A caring/task-involving climate intervention for youth sport camp leaders. *Kansas Association for Health, Physical Education, and Recreation Journal*.
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- Fry, A.C., Ciroslan D., Fry M.D., LeRoux C.D., Schilling B.K., and Chiu L.Z.F. (2006), Anthropometric and performance variables discriminating elite junior weightlifters. *Journal of Strength and Conditioning Research*, 20, 861-866.
- Smith, S., Fry, M. D., Ethington, C., & Li, Y. (2005). The effects of athletes' perceptions of their coaching behaviors on their perceptions of the motivational climate. *Journal of Applied Sport Psychology*, 17, 1-8.
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- Walling, M. D., Duda, J. L., & Crawford, T. (2002). Goal orientations, outcome, and responses to youth sport competition among high/low perceived ability athletes. *International Journal of Sport Psychology*, 14, 140-156.

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- Fry, M. D.** (1998). Al Oerter: An Olympian's views as seen from a sport psychology perspective. *Strength and Conditioning*, 20, 7-14.
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- Walling, M. D.**, & Duda, J. L. (1995). Motivating kids: Balance learning and fun. *Sport Psychology Training Bulletin*, 4, 1-8.
- Duda, J. L., Chi, L., Newton, M. L., **Walling, M. D.**, & Catley, D. (1995). Task and ego orientation and intrinsic motivation in sport. *International Journal of Sport Psychology*, 26, 40-63.
- Walling, M. D.**, & Martinek, T. (1995). Learned helplessness in a sixth-grade physical education student: A case study. *Journal of Teaching in Physical Education*, 14, 454-466.
- Walling, M. D.**, Duda, J. L., & Chi, L. (1993). The perceived motivational climate in sport questionnaire: Construct and predictive validity. *Journal of Sport and Exercise Psychology*, 15, 172-183.

Invited Book Chapters

- Gano-Overway, L., & **Fry, M. D.** (in press). Caring climates. In L. Davis, R. Keegan, & S. Jowett (Eds.), *Social Psychology of Sport* (Second Edition). Champaign, IL: Human Kinetics.
- Fry, M. D.**, & Fontana, M. (in press). Did you hear the one about the hilarious professor? Yeah, me neither: Incorporating humor in sport psychology to enhance motivation and relieve stress. In K. Vaidya (Ed.), *Teach Exercise & Sport With a Sense of Humor: Why and How to Be a Funnier and More Effective Exercise & Sport Teacher and Laugh All the Way to Your Classroom?* Curious Academic Publishing.

- Fry, M. D., & Hogue, C. M.** (2021). Foundational psychological theories, models, and constructs. *Certified Mental Performance Consultant Essentials Resource Guide*. Association for Applied Sport Psychology.
- Fry, M. D., & Moore, E. W. G.** (2019). *Motivation in sport: Theory to application*. In M. H. Anshel (Ed.), T. Petrie, E. Labbe, S. Petruzello, & J. Steinfeldt (Assoc. Eds.), *APA handbook of sport and exercise psychology: Vol. 1. Sport psychology*. Washington DC: American Psychological Association.
- Fry, M. D., & Hogue, C. M.** (2018). Psychological considerations for children in sport and performance. In Oliver Braddick (Ed.), *Oxford Research Encyclopedia of Psychology*. New York: Oxford University Press.
- Fry, M. D.** (2014). Sport and Exercise Psychology as a Venue to Develop “Difference Makers”. In K. Vaidya (Ed.), *Exercise and Sports for the Curious: Why Study Exercise and Sports*. Curious Academic Publishing.
- Fry, M. D.** (2001). The development of motivation in children. In G. Roberts (Ed.), *Motivation in sport and exercise (2nd Ed.)*, pp. 51-78, Champaign, IL: Human Kinetics.

Book

- Fry, M. D., Gano-Overway, L., Guivernau, M., Kim, M., & Newton, M.** (2020). *A Coach's Guide to Maximizing the Youth Sport Experience: Work Hard and Be Kind*. NY: Routledge.

PRESENTATIONS

Invited International Presentations

- Fry, M. D.** (2019). *Achievement goal perspective theory as a framework for interventions in sport and physical activity*. Autonomous University of Baja California; Ensenada, Mexico.
- Fry, M. D.** (2019). *Utilizing goal orientations as a lens to optimize athletes' motivation*. Autonomous University of Baja California; Ensenada, Mexico.
- Fry, M. D.** (2019). *Building a caring and task-involving climate in sport through words, activities, and core values*. Autonomous University of Baja California; Ensenada, Mexico.
- Fry, M. D.** (2019). *Team building to foster positive relationships on sport teams*. Autonomous University of Baja California; Ensenada, Mexico.
- Fry, M. D.** (2016). *The power of a caring and task-involving climate in sport*. Children International; Guatemala City, Guatemala/.
- Fry, M. D.** (2005, March). *Creating a positive motivational climate in physical activity settings*. Sao Paulo, Brazil.
- Duda, J. L., & Walling, M. D.** (1993, November). *Toward a developmental theory of motivation in sport*. University of Barcelona, Barcelona, Spain.
- Walling, M. D.** (1993, November). *The examination of Nicholls' developmental theory of motivation in the physical domain*. University of Valencia, Valencia, Spain.
- Walling, M. D.** (1993, November). *Motivational aspects in physical education for school-age Children*. National Physical Education Institute, Lleida, Spain.
- Duda, J. L., & Walling, M. D.** (1993, November). *A conceptual and empirical examination of the motivational climate created by coaches*. University of Barcelona, Barcelona, Spain.

Refereed Presentations at National Conferences

- Scott, C., **Fry, M. D.**, Wineinger, T. O., & Iwasaki, S. (2021). *Staying positive during the COVID-19 Pandemic: The impact of collegiate team climate*. Association for Applied Sport Psychology, Virtual.
- Wineinger, T. O., Rosen, D., & **Fry, M. D.** (2021). *The influence of a motivational intervention on participants' physiological measures of effort and muscle performance*. Association for Applied Sport Psychology, Virtual.
- Scott, C., **Fry, M. D.**, Wineinger, T., & Weingartner, H. (2020). *Collegiate sport club athletes' perceptions of the climate on their teams and indices of their psychological well-being*. Association for Applied Sport Psychology, Virtual.
- Wineinger, T. O., & **Fry, M. D.** (2020). *A sport psychology lab partners with the Women's Intersport Network (WIN) to optimize young girls' sport camp experiences*. Association for Applied Sport Psychology, Virtual.
- Fry, M. D.**, Claunch, J., Hogue, C. M., Iwasaki, S., & Peynetsa, I. (2019). *A coaching education collaboration for American Indian Youth Sport Coaches on the Zuni Reservation*. Association for Applied Sport Psychology. Portland, OR.
- Moore, E. W. G., & **Fry, M. D.** (2018). *Elementary physical education students' motivational climate perceptions predict goal orientations and physical education satisfaction*. International Society of Behavioral Nutrition and Physical Activity. Hong Kong.
- Pan, T. Y., Davis, A. M., Atchley, R. A., Forbush, K. T., Wallace, D. P., Savage, C. R., & **Fry, M.D.** (2018). *The longitudinal relationship between obesity and depression in children*. American Psychological Association, San Francisco, CA.
- Warlick, C., Krieschok, T., Frey, B., Kerr, B., . . . & **Fry, M. D.** (2018). *Does hope matter? Examining a popular positive psychology construct in a DBT intensive-outpatient community health population*. Association for Behavioral and Cognitive Therapies.
- Breske, M., **Fry, M. D.**, A., & Hogue, C. M. (2017). *The effects of goal priming on cortisol responses in an ego-involving climate*. Association for Applied Sport Psychology, Orlando, FL.
- Chamberlin, J., **Fry, M. D.**, & Iwasaki, S. (2017). *The influence of high school athletes' perceptions of the motivational climate on athletic identity and academic endeavors*. Association for Applied Sport Psychology, Orlando, FL.
- Easton, L., **Fry, M. D.**, & Iwasaki, S. (2017). *The relationship of fitness center members' goal orientations and perceptions of the motivational climate to variables related to well-being and motivational responses*. Association for Applied Sport Psychology, Orlando, FL.
- Fontana, M. & **Fry, M. D.** (2017). *Exploring the relationship between motivational climate and shame*. Association for Applied Sport Psychology, Orlando, FL.
- Fry, M. D.**, Thompson, J., Iwasaki, S., & Reid, C. (2017). *Bridging theory, research, and practice in youth sports: sport psychology's partnership with positive coaching alliance to enhance youth sport*. Association for Applied Sport Psychology, Orlando, FL.
- Glover, K., **Fry, M. D.**, & Weingartner, H. (2017). *Helping a women's intersport network provide a winning experience for girls in their summer sport camps*, Association for Applied Sport Psychology, Orlando, FL.

- Iwasaki, S., & **Fry, M. D.** (2017). *An exploration of the relationship among female adolescent athletes' perceptions of the motivational climate, goal orientation, refocusing, and peak ability*. International Society of Sport Psychology 14th World Congress, Sevilla, Spain.
- Tyler, E., Warlick, C., Cole, B., & **Fry, M. D.** (2017). *Collegiate student-athletes' perceptions of their sport team climate and level of hope*. Association for Applied Sport Psychology, Orlando, FL.
- Tyler, E., Warlick, C., Cole, B., & **Fry, M. D.** (2017). *Relationship among student-athletes' perceptions of the climate, locker room talk, and sexual behaviors*. Association for Applied Sport Psychology, Orlando, FL.
- Hogue, C. M., **Fry, M. D.**, & Fry, A. C. (2017). *Adolescents' Physiological Stress Responses to Motivational Climate in a Physical Education Setting*. Society for Physical Education and Health, Boston, MA.
- Claunch, J. & **Fry, M. D.** (2016). *Setting the stage for a motivational climate collaboration*. Association for Applied Sport Psychology, Phoenix, AZ.
- Chamberlin, J., **Fry, M. D.**, & Iwasaki, S. (2016). *High school athletes' perceptions of the motivational climate in their off-season Training Programs*. Association for Applied Sport Psychology, Phoenix, AZ.
- Easton, L., Iwasaki, S., & **Fry, M. D.** (2016). *The relationship of members' perceptions of the motivational climate to their Psychological well-being at a university medical center fitness facility*. Association for Applied Sport Psychology, Phoenix, AZ.
- Fry, M. D.**, Iwasaki, S., Vanorsby, H., & Breske, M. (2016). *Masters' swimmers' perceptions of the climate in their training facilities and their motivational responses*. Association for Applied Sport Psychology, Phoenix, AZ.
- Fry, M. D.**, Solomon, G., Iwasaki, S., Madeson, M., Vanorsby, H., Meisinger, R., & Haberer, J. (2016). *Division I athletes' perceptions of their team climate, mental skills, and mindfulness*. Association for Applied Sport Psychology, Phoenix, AZ.
- Hogue, C. M., **Fry, M. D.**, & Fry, A. C. (2016). *Physiological and psychological stress responses to a motivational climate intervention*. Association for Applied Sport Psychology, Phoenix, AZ.
- Fontana, M., & **Fry, M. D.** (2016). *Creating and validating the Shame in Sport Questionnaire*. Association for Applied Sport Psychology, Phoenix, AZ.
- Hogue, C. M., & **Fry, M. D.** (2016). *Leader observations of participant behaviors during a motivational climate intervention: A qualitative investigation*. Association for Applied Sport Psychology, Phoenix, AZ.
- Iwasaki, S., & **Fry, M. D.** (2016). *Male High School Athletes' Perceptions of Their Team Climate and Mindful Engagement*. Association for Applied Sport Psychology, Phoenix, AZ.
- Iwasaki, S., **Fry, M. D.**, Vanorsby, H., Breske, M. (2016). *Master swimmers' perceptions of the climate in their training facilities and their motivational responses*. Association for Applied Sport Psychology, Phoenix, AZ.
- Brown, T. C., M. S., **Fry, M. D.**, Breske, M., Iwasaki, S., & Wilkinson, T. (2015). *High school athletes' perceptions of their sport team climate and their willingness to report concussion symptoms*. Association for Applied Sport Psychology, Indianapolis, IN.
- Fry, M. D.**, Brown, T. C., Iwasaki, S., Breske, M., & Wilkinson, T. (2015). *Middle school athletes' perceptions of their sport team climate and their willingness to report concussion symptoms*. Association for Applied Sport Psychology, Indianapolis, IN.

- Fry, M. D., & Easton, L.** (2015). *Health in Action: Helping students design creative interventions onsite*. Kansas Alliance for Physical Education, Health, Recreation, & Dance, Wichita, KS.
- Fontana, M. S., Iwasaki, S., Hogue, C., Claunch, J., Poux, K., & **Fry, M. D.** (2014). *Initiating mental skills training with a high school freshman baseball*. Association for Applied Sport Psychology, Las Vegas, NE.
- Fry, A.C., **Fry, M. D.**, Sterczala, A. J., Chiu, L. Z. F., Schilling, B., & Weiss, L. W. (2014). *High power resistance exercise overreaching can be monitored with a training questionnaire*. National Strength and Conditioning Association, Las Vegas, NE.
- Medina, R, **Fry, M. D.**, & Iwasaki, S. (2014). *Youngsters' perceptions of the climate and their experiences in recreational exercise classes*. Association for Applied Sport Psychology, Las Vegas, NE.
- Rosen, D., & **Fry, M. D.** (2014). *Motivational climate and seniors' experiences in group exercise classes*. Association for Applied Sport Psychology, Las Vegas, NE.
- Hogue, C. M., & **Fry, M. D.** (2013). *A qualitative examination of participant reactions to a motivational climate intervention*. Association for Applied Sport Psychology, New Orleans, LA.
- Kwon, S., & **Fry, M. D.** (2013). *Mediational role of interest and intrinsic motivation between perceived caring climate and satisfaction and attitudes among physical education students*. Association for Applied Sport Psychology, New Orleans, LA.
- Moore, E. W. G., & **Fry, M. D.** (2013). *PE teachers' perspective on a motivational climate professional development session*. Association for Applied Sport Psychology, New Orleans, LA.
- Claunch, J. & **Fry, M. D.** (2013). *Transformative learning experience: Collegiate football coaches' perceptions of participating in a motivational climate intervention*. Association for Applied Sport Psychology, New Orleans, LA.
- Moore, E. W. G., & **Fry, M. D.** (2012). *Goal orientations, motivational climate, and outcomes in physical education across one semester*. Association for Applied Sport Psychology to held in Atlanta, GA.
- Kwon, S., & **Fry, M. D.** (2012). *The change of physical educators' enjoyment and intrinsic motivation of track and field through PST*. Association for Applied Sport Psychology, Atlanta, GA.
- Iwasaki, S., & **Fry, M. D.** (2012). *Physical education students' perceptions of the climate and their psychological well-being*. Association for Applied Sport Psychology, Atlanta, GA.
- Hogue, CM., **Fry, M.D.**, Fry, A.C., & Pressman, S. D. (2012). *Participant salivary cortisol and psychological responses to a motivational climate intervention*. Association for Applied Sport Psychology, Atlanta, GA.
- Fry, M. D.**, Brown, T. C., & Iwasaki, S. (2012). *Girls' self perceptions after participating in a positive life skills/physical activity program*. Association for Applied Sport Psychology, Atlanta, GA.
- Brown, T. C., & **Fry, M. D.** (2012). *Results of a caring, task-involving climate intervention at a recreation center*. Association for Applied Sport Psychology, Atlanta, GA.
- Kwon, S., & **Fry, M. D.** (2011). *The effects of athletes' self-management on their self-confidence*. Association for Applied Sport Psychology, Honolulu, HI.
- Andre, M. J., Fry, A.C., Gallagher, P. M., Vardiman, P., **Fry, M. D.** Kudrna, B., Gandy-Moody,

- N., & McCartney, M. (2011). *The effects of a pre-workout caffeine supplement on endogenous growth hormone levels*. A presentation made at the meeting of the National Strength and Conditioning Association, Las Vegas, NE.
- Hogue, C. M., Iwasaki, S., & **Fry, M. D.** (2011). *A case study of a physical activity/mental skills training intervention with a young athlete*. Association for Applied Sport Psychology, Honolulu, HI.
- Iwasaki, S., & **Fry, M. D.** (2011). *The exploration of motivational climate in a youth sport basketball camp*. Association for Applied Sport Psychology, Honolulu, HI.
- Fry, M. D.** (2011). *From the Strong Girls' viewpoints: Research results from semester 1*. Association for Applied Sport Psychology, Honolulu, HI.
- Fry, M. D.** (2011). *The exercise climate: An introduction to the research on examining task-involving and caring climates in the exercise domain*. Association for Applied Sport Psychology, Honolulu, HI.
- Fry, M. D.,** Hogue, C. M., Sauer, S. (2011). *Using digital storytelling as a creative tool in health*. American Alliance of Health, Physical Education, Recreation, & Dance, San Diego, CA.
- Kwon, S., & **Fry, M. D.** (2010). *Relationship of exercisers' perceptions of the motivational climate to their flow experience*. Association of Applied Sport Psychology, Providence, RI.
- Iwasaki, S., Merczek, K., & **Fry, M. D.** (2010). *Young athletes' experiences in a volleyball camp*. Association of Applied Sport Psychology, Providence, RI.
- Iwasaki, S., Sogabe, A., **Fry, M. D.,** & Christensen, E. (2010, June). *Differences in aggression and social skills among judo and non-judo practitioners*. American College of Sports Medicine, Baltimore, MD.
- Hogue, C. M., **Fry, M. D.,** & Brown, T. C. (2010). *Incorporating team building activities in a summer day camp for children: Lessons learned*. Association of Applied Sport Psychology, Providence, RI.
- Brown, T. C., & **Fry, M. D.** (2010). *Caring climate intervention for sport skills and fitness camp leaders*. Association of Applied Sport Psychology, Providence, RI.
- Brown, T. C., & **Fry, M. D.** (2010). *Teaching life skills in a physical activity after-school program*. American School Health Association, Kansas City, MO.
- Moore, E. W., & **Fry, M. D.** (2009). *The effect of a caring and task-involving climate on student empowerment and ownership in physical activity classes*. Association for Applied Sport Psychology, Salt Lake City, UT.
- Kwon, S., & **Fry, M. D.** (2009). *Members' perceptions of their fitness club climate and their exercise flow*. Association for Applied Sport Psychology, Salt Lake City, UT.
- Hogue, C. M., **Fry, M. D.,** & Dodd, R. (2009). *Athletes' perceptions of the climate at their training centers and their motivational responses*. Association for Applied Sport Psychology, Salt Lake City, UT.
- Fry, M. D.** (2009). *From theory to practice: Creating positive and caring environments in the real world*. Association for Applied Sport Psychology, Salt Lake City, UT.
- Brown, T. C., & **Fry, M. D.** (2009). *Students' perceptions of their exercise class environment and their psychological well-being*. Association for Applied Sport Psychology, Salt Lake City, UT.
- Marshall, K., Stephens, L., Grindle, V., **Fry, M. D.,** & Li, Y. (2009). *Mental imagery and EEG*

- activity in elite and novice collegiate soccer players.* Association for Applied Sport Psychology to be, Tampa, FL.
- Brown, T. C., & **Fry, M. D.** (2009). *Participants' perceptions of a caring and positive climate in their exercise classes.* American Alliance of Health, Physical Education, Recreation, & Dance, Tampa, FL.
- Fry, M. D.**, Dodd, R. K., & Brown, T. C. (2008). *Young athletes' perceptions of their coaches' and teammates' caring and uncaring behaviors.* Association for Applied Sport Psychology, St. Louis, MO.
- Binkley, S.E., & **Fry, M. D.** (2007). *The relationship of college students' perceptions of their BMI and weight status to their physical self-concept.* Association for Applied Sport Psychology, Louisville, KY.
- Smith, H., **Fry, M.D.**, Li, Y., & Weiss, L. (2006). *The relationship of anxiety and self-confidence to treadmill exercise tolerance tests performance by sedentary obese women.* Association for the Advancement of Applied Sport Psychology, Miami, FL.
- McCarty, L., **Fry, M.D.**, & Curly, C. (2006). *The relationship of a caring climate to motivational responses and psychological well-being in youth baseball.* Association for the Advancement of Applied Sport Psychology, Miami, FL.
- Gano-Overway, L. A., Newton, M., Magyar, AM., **Fry, M. D.**, Kim, M., & Guivernau, M. (2006). *Caring, self-regulatory efficacy, empathic efficacy, and prosocial/antisocial behaviors in a physical activity setting.* Association for the Advancement of Applied Sport Psychology, Miami, FL.
- Fry, A.C., Haneishi, K., Moore, C.A., Schilling, B.K., Li, Y., & **Fry, M.D.** (2006). *Cortisol and stress responses during a game and practice in female collegiate soccer players.* National Conference on Student Assessment, Washington, D.C.
- Bricker, J. B., & **Fry, M. D.** (2005). *The influence of injured athletes' perceptions of social support from their certified athletic trainers on athletes' beliefs about rehabilitation.* Association for the Advancement of Applied Sport Psychology, Vancouver, British Columbia, Canada.
- Magyar, M., Guivernau, M., Gano-Overway, L., Newton, M., **Fry, M.D.**, Kim, M., & Watson, D. (2005). *Exploring the relationship between the caring climate and achievement goal theory among underserved youth in physical activity.* American Alliance of Health, Physical Education, Recreation & Dance, Chicago, IL.
- Fry, M.D.**, & Newton, M. (2004, September). *The development of the Caring Climate Questionnaire.* Association for the Advancement of Applied Sport Psychology, Minneapolis, MN.
- Smith, S., **Fry, M.D.**, & Ethington, C. (2004, September). *The effect of female athletes' perceptions of their coaches' behaviors on their perceptions of the motivational climate.* Association for the Advancement of Applied Sport Psychology, Minneapolis, MN.
- McCay, K., & **Fry, MD.** (2004, September). *The examination of goal perspective theory in relationship to measures of psychological well-being.* Association for the Advancement of Applied Sport Psychology, Minneapolis, MN.
- McCay, K., & **Fry, M.D.** (2004, March). *Predictors of adolescent depression: The role of physical activity and body image.* Society of Behavioral Medicine, Baltimore, MD.
- Henry, H., & **Fry, M.D.** (2003, October). *Corporate fitness members' perceptions of the*

motivational climate, their intrinsic motivation, and perceptions of being valued by their employer. Association for the Advancement of Applied Sport Psychology, Philadelphia, PA.

Fry, M.D., Pittman, L., McCay, K., & Wendell, M. (2003, October). *A qualitative examination of underserved 4th grade girls' views about physical education.* Association for the Advancement of Applied Sport Psychology, Philadelphia, PA.

Fry, M. D., Abma, C., Wood, J., & Melland, B. (2002, October). *The effects of an after-school physical activity and life skills program on 4th graders' self concept, motivational perspectives, and fitness levels.* Association for the Advancement of Applied Sport Psychology, Tucson, AZ.

Abma, C., & **Fry, M. D.** (2002, October). *The effects of an imagery intervention on the trait confidence levels of female college volleyball players.* Association for the Advancement of Applied Sport Psychology, Tucson, AZ.

Duda, J.L., Smith, M., & **Fry, M. D.** (2002, June). *An examination of learned helpless responses among young children engaged in physical tasks.* North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD.

Newton, M., **Fry, M.D.,** & Bernhardt, P. (2001, October). *Examination of the interactive relationship of goal orientations, perceptions of the motivational climate, and perceived ability in youth tennis players.* Association for the Advancement of Applied Sport Psychology, Orlando, FL.

Abma, C. & **Fry, M. D.** (2001, May). *A qualitative examination of underserved 8th grade female students' attitudes about physical education.* 10th World Congress of Sport Psychology held in Skiathos, Greece.

Lattimore, D., **Fry, M. D.,** & Balas, C. (2000, October). *Students' perceptions of the motivational climate and their motivational responses in physical education.* Association for the Advancement of Applied Sport Psychology, Nashville, TN.

Fry, M. D., Lattimore, D., & Balas, C. (2000, October). *A developmental examination of children's accuracy in judging their physical ability in physical education.* Association for the Advancement of Applied Sport Psychology, Nashville, TN.

Fry, M.D., & Newton, M. (1999, September). *Goal orientations, perceptions of the motivational climate, and motivational responses of urban youth tennis players.* Association for the Advancement of Applied Sport Psychology, Banff, Canada.

Fry, M. D., Lattimore, D., & Balas, C. (1999, September). *A developmental analysis of conceptions of effort and physical ability among underserved youth.* Association for the Advancement of Applied Sport Psychology, Banff, Canada.

Harber, M. P., **Fry, M. D.,** & Fry, A. C. (1998). *Sources of stress identified by elite collegiate weightlifters.* A paper presented at the annual meeting of the National Strength and Conditioning Association, Nashville, TN.

Fry, M. D., Fry, A. C., & Newton, M. (1997, September). *Sources of stress identified by elite junior weightlifters.* Association for the Advancement of Applied Sport Psychology, San Diego, CA.

Newton, M., **Fry, M. D.,** & Sandberg, J. (1997). *Goal orientations and purposes of sport and beliefs concerning success among senior Olympians.* North American Society for the Psychology of Sport and Physical Activity, Denver, CO.

Fry, M. D. (1997, March). *Symposium: Goal perspectives in physical education and sport:*

- Theory into practice*. American Alliance for Health, Physical Education, Recreation, and Dance, St. Louis, MO.
- Fry, M. D.** (1996, October). *Children's understanding of luck and ability: A developmental analysis*. Association for the Advancement of Applied Sport Psychology, Williamsburg, VA.
- Fry, M. D.** (1996, October). *The motivational climate in sport and physical education: An introduction to theory and research*. Association for the Advancement of Applied Sport Psychology, Williamsburg, VA.
- Fry, M. D., & Fry, A. C.** (1996, June). *Goal perspectives and motivational responses of elite junior weightlifters*. National Strength and Conditioning Association, Atlanta, GA.
- Fry, M. D., & Alexander, C.** (1996, June). *Children's understanding of task difficulty: A developmental analysis*. North American Society for the Psychology of Sport and Physical Activity, Cleveland's House, Canada.
- Duda, J. L., & Walling, M. D.** (1995, October). *Views about the Motivational climate and their self perceptions/affective correlates: The case for young elite female gymnasts*. Association for the Advancement of Applied Sport Psychology, New Orleans, LA.
- Newton, M. L., & Walling, M. D.** (1995, October). Goal orientations and beliefs about the causes of success among senior Olympic games participants. North American Society for the Psychology of Sport and Physical Activity, Asilomar, CA.
- Walling, M. D.** (1994, October). *Developmental differences in children's views regarding physical competence*. Association for the Advancement of Applied Sport Psychology, Lake Tahoe, NV.
- Walling, M. D., & Duda, J. L.** (1994, June). *Children's understanding of effort and ability in the physical domain*. North American Society for the Psychology of Sport and Physical Activity, Clearwater Beach, FL.
- Walling, M. D., Duda, J. L., Newton, M., & White, S.** (1993, October). *The Task and Ego Orientation in Sport Questionnaire: Further analysis with youth sport participants*. Association for the Advancement of Applied Sport Psychology, Montreal, CANADA.
- Walling, M. D., & Duda, J. L.** (1993, March). *Goals and their associations with beliefs about success in and perceptions of the purpose of physical education*. American Alliance for Health, Physical Education, Recreation, and Dance, Washington, DC.
- Walling, M. D.** (1993, February). *Children's conceptions of effort and ability in the physical domain: A dissertation in progress*. Midwest Sport Psychology Symposium, Miami University, Oxford, OH.
- Walling, M. D., Duda, J. L., & Crawford, T.** (1992, October). *The relationship between goal orientations and positive attitudes toward sport and exercise among young athletes*. Association for the Advancement of Applied Sport Psychology, Colorado Springs, CO.
- Walling, M. D., Duda, J. L., & Crawford, T.** (1992, June). *The psychometric properties of the perceived motivational climate in sport questionnaire: Further investigation*. North American Society for the Psychology of Sport and Physical Activity, Pittsburgh, PA.
- Walling, M. D., Crawford, T., Duda, J. L., & Wigglesworth, J.** (1992, April). *Are we having fun yet and will we want to play again?: The interrelationships between goal perspectives and other motivational variables in youth sport athletes*. American Alliance for Health, Physical Education, Recreation, and Dance, Indianapolis, IN.
- Walling, M. D., & Catley, D.** (1992, April). *Jack and Jill in physical education class: Do they*

think their instructor treats them differently? American Alliance for Health, Physical Education, Recreation, and Dance, Indianapolis, IN.

Walling, M. D., & Catley, D. (1992, February). *Sex role stereotyping among college instructors and students' perceptions of instructor gender bias.* Midwest Sport Psychology Symposium, Purdue University, West Lafayette, IN.

Walling, M. D., Catley, D., & Taylor, A. (1991, June). *The interrelationships between goal perspectives, perceived competence, and indices of intrinsic motivation.* North American Society for the Psychology of Sport and Physical Activity, Asilomar, CA.

Walling, M. D. (1991, April). *Learned helplessness: A case study of a sixth-grade physical education student.* American Alliance for Health, Physical Education, Recreation and Dance, San Francisco, CA.

Webinar

Fry, M. D., & Hogue, C. M. (2019). *Theories and Models in Sport Psychology: A Review.* Association for the Advancement of Applied Sport Psychology.

State/Regional Presentations

Gray, R., & Fry, M. D. (2020). *Employing a buddy system to foster physical activity among college students with a physical disability.* Midwest Sport Psychology Symposium, Illinois State University.

Wineinger, T., & Fry, M. D. (2020). A collaboration between a sport psychology lab with a youth sport organization: Helping WIN create an optimal sport experience. Midwest Sport Psychology Symposium, Illinois State University.

Fry, M. D. (2018). *Three ideas for incorporating sport psychology into practice and competition.* Greenbush Coaches' Workshop.

Fry, M. D. (2018). *Three more ideas for incorporating sport psychology into practice and competition.* Greenbush Coaches' Workshop.

Fry, M. D. (2017). *Sport Psychology: Setting a Positive Tone for the Team* (Sessions A & B, repeated). Greenbush Fall Coaches' Workshop.

Fry, M. D. (2016). *KU Graduate Programs in Health, Sport & Exercise Science.* Morehouse College Graduate Program Fair (February, 2016).

Fry, M. D. (2016, Fall). *Keys to Helping Athletes Develop Strong Mental Skills: The Role of Sport Psychology.* Keynote for Greenbush Coaching Conference, Eudora, KS.

Fry, M. D. (2016, Spring). *Working with and bringing out the best in difficult athletes.* Greenbush Coaching Conference, Eudora, KS.

Fry, M. D. (2015). *Bringing out the Best in Every Swimmer: The Contribution of Sport Psychology.* Keynote delivered to US Master Swim at their National Conference; Kansas City, KS.

Fry, M. D. (2015). *Caring Climates for Physical Activity Settings.* University of Milwaukee, Wisconsin.

Fry, M. D. (2015). *Creating a Caring Climate to Maximize Athletes' Potential On and Off the Field.* Keynote presented at the Positive Coaching Alliance Trainers' Institute.

Fry, M. D. (2015). *Maximizing Athletes' Potential On and Off the Field.* Keynote delivered to X's and O's Coaching Education Workshop, Emporia State University, Emporia, KS.

Fry, M. D. (2015). *Setting the Stage for Coaches to Optimize Athletes' Motivation.* Big XII invited lecture at Texas Christian University; Fort Worth, TX.

- Fry, M. D., Moore, E., W., G., Iwasaki, S., Fontana, M., Hogue, C., Claunch, J., & McGhee, R.** (2012). *Building Mentally Strong Athletes: Ideas for Incorporating Mental Skills Training with Sport Teams*. Kansas Alliance for Health, Physical Education, Recreation, & Dance in Lawrence, KS.
- Fry, M. D.** (2012). *Strong Girls: Hearing About the Benefits of a Physical Activity/Positive Life Skills Program from the Leaders and Kids*. Kansas Alliance for Health, Physical Education, Recreation, & Dance in Lawrence, KS.
- Moore, E. W., & Fry, M. D.** (2010). *Kids don't care what you know until they know that you care: Tips for building caring environments*. Kansas Alliance for Health, Physical Education, Recreation & Dance, Wichita, KS.
- Brown, T., Fry, M. D., & Hogue, C.** (2010). *Positive life skills for every walk of life*. Kansas Alliance for Health, Physical Education, Recreation & Dance, Wichita, KS.
- Fry, M. D., Brown, T., Moore, E. W., Hogue, C., Sauer, S., & Beyer, J.** (2010). *Team time: Team building activities for any group to use and process*. Kansas Alliance for Health, Physical Education, Recreation & Dance, Wichita, KS.
- Williamson, K., & Fry, M. D.** (2009). *Bringing out the best in your athletes: Making sport fun again while enhancing your team's competitive edge*. Kansas Alliance for Health, Physical Education, Recreation & Dance, Pittsburg, KS.
- Moore, W. E., & Fry, M. D.** (2009). *Are we building character or characters?: Strategies for promoting integrity among young athletes*. Kansas Alliance for Health, Physical Education, Recreation & Dance held in Pittsburg, KS.
- Brown, T. C., & Fry, M. D.** (2009). *Ideas to implement in a youth physical activity life skills program*. Kansas Alliance for Health, Physical Education, Recreation and Dance held in Pittsburg, KS.
- Fry, M. D., Dodd, R., Brown, T. C.** (2008). *Getting them interested and coming back: Creating a positive and caring environment in exercise settings*. Kansas Association of Health, Physical Education, Recreation and Dance, Emporia, KS.
- Fry, M. D.** (2005). *Creating a Positive Climate and Optimizing Motivation in Physical Education & on Sport Teams*. An invited presentation for the Lutheran Schools Midsouthern Regional Conference held in Memphis, TN.

SUPPORT

EXTERNAL FUNDING	AGENCY/SOURCE	AMOUNT	PERIOD
Creating Optimal Climate for Youth With Congenital Heart Disease	American Council on Exercise	\$2400	2021-2022
Climate Free Throw Intervention	Association for Applied Sport Psychology	\$4980	2021-2022
Strong Girls	Association for Applied Sport Psychology	\$4625	2019-2020
Rock Chalk, Zuni	Running Strong for American Indian Youth	\$5000	2017-2018
KU PCA Initiative	Positive Coaching Alliance/	\$75,000	2017-2020

David and Margaret Shirk Physical Education Programs Fund			
Strong Girls: A positive life skills intervention for 3 rd -5 th girls	Kohl's Cares for Kids	\$4000	2011
Students' salivary stress responses when juggling in two distinct motivational climates	Association of Applied Sport Psychology	\$2800	2010-11
Effects of resistance exercise and a Pre-workout dietary supplement on Physiological adaptations	Labrada	\$5000	2010
Strong Girls: A positive life skills physical activity intervention for elementary school girls	Association of Applied Sport Psychology	\$3220	2009-10
Fostering & maintaining motivation among urban youth tennis players	United States Tennis Association	\$10,000	1997-98

EXTERNAL PROPOSALS NOT FUNDED	AGENCY/SOURCE	AMOUNT	PERIOD
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Children's International Guatemala & US Collaboration	ASportsUnited: International Sports Programming Initiative	\$224,953	2012
Dare to Care: Tackling Childhood Obesity	Albert Foundation	\$46,000	2013
Strong Girls: A positive life skills/physical activity program	Live-Well Lawrence-Kansas Health Foundation	\$5000	2011
Strong Girls: A positive life skills/physical activity program for girls	Payless Foundation	\$15,000	2011
Strong Girls: A positive life skills/Physical activity program for children	Sprint Foundation	\$168,000	2011

SUPPORT

INTERNAL FUNDING	AGENCY/SOURCE	AMOUNT	PERIOD
Research Excellence Initiative" A Collaboration to Train Biology Lab Instructors to Create a Caring & Task Involving Climate	University of Kansas; College of Liberal Arts & Sciences	\$30,000	2019-2020 (under review)

Strong Girls: A community life skills/physical activity research and service project for elementary girls in Lawrence.	University of Kansas KU SOE Academic Year Research Support	\$8000	2011
Examining the motivational climate in a national fitness company.	University of Kansas Faculty Research Grant	\$5000	2010
Strong Girls: A physical activity and life skills intervention for faculty adolescent girls.	University of Kansas Research Grant	\$6000	2009
A team building/mental skills intervention for children enrolled in a summer camp.	University of Kansas New Faculty Research Grant	\$8000	2008
The relationship between young athletes' perceptions of a caring climate on their sport teams to their motivational responses	University of Memphis Faculty Research Grant	\$6000	2005
Effect of a strength training intervention for underserved elementary students	University of Memphis Faculty Research Grant	\$4000	2000-02
An examination of black females' perceptions of physical activity	Center for Research on Educational Policy, University of Memphis	\$5000	2000
Children's perceptions of ability and their motivational responses in physical education class.	Center for Research on Educational Policy, University of Memphis	\$3800	1999
The motivational implications of students' understanding of effort and ability in the physical domain.	University of Memphis Faculty Research Grant	\$4000	1995
Children's understanding of luck and ability, and task difficulty.	University of Memphis Faculty Research Grant	\$3000	1994
Developmental differences in children's conceptions of ability, effort, and task difficulty in the physical domain.	Purdue Foundation Grant	\$9,900 (per year for 2 years)	1992-94

Memberships in Professional Organizations

American Psychological Association (2017-present)
 American Alliance for Health, Physical Education, Recreation, and Dance (1988-2017).
 Association for Applied Sport Psychology, Member (1991-present).
 Kansas Alliance for Health, Physical Education, Recreation, & Dance (2008-present).
 North American Society for the Psychology of Sport and Physical Activity, Member (1988-2000).
 Indiana Association for Health, Physical Education, Recreation, and Dance, Member (1993-1994).
 Tennessee Association for Health, Physical Education, Recreation, and Dance, Member (1994-2000).

Teaching Responsibilities:**Undergraduate**

EXSS 3307 Psychosocial Aspects of Sport [UMemphis]
 EXSS 3450 Psychological Aspects of Exercise [UMemphis]*
 EXSS 4605 Internship in Exercise & Sport Science [UMemphis]
 EXSS 4999 Senior Project in Health, Physical Education, & Recreation [UMemphis]*
 HSES 385 Psychological Aspects of Exercise [KansasU]*
 HSES 440 Applied Sport Psychology [KansasU]*

Graduate

EXSS 7173 Sport and Exercise Psychology [UMemphis]*
 EXSS 6903 Developmental Perspectives in Youth Sport [UMemphis]*
 EXSS 7133 Current Readings: Motivation in Physical Activity Settings [UMemphis]*
 EXSS 7907 Special Topics: Applied Sport Psychology [UMemphis]*
 HSES 798 Special Course: Creating a Positive Environment in Physical Activity Settings [KansasU]*
 HSES 798 Special Course: Sport Psychology Within Youth Sport [KansasU]*
 HSES 798 Special Course: Advanced Sport Psychology [KansasU]**
 HSES 804 Sport Psychology [KansasU]**
 HSES 806 Stress Management [KansasU]*
 HSES 823 Behavior Modification [KansasU]
 HSES 892 Psychological Foundations of Sport and Physical Activity [KansasU] *
 HSES 982 Research Ethics [KansasU]

*Courses I developed.

Community Presentations

Fry, M. D. (November, 2017). *Lead campus participation in celebration of World Kindness Day.*

Fry, M. D. (June, 2016). *Mental Skills: A Key Ingredient for Excellence in Cross Country.* Workshop for Eudora High School Cross Country Team; Eudora, KS.

Fry, M. D. (2016). *Creating a Caring and Task-Involving Climate in CI's Game On Program.* A presentation for CI Employees at the International Headquarters Office in Kansas City, KS.

Fry, M. D. (2016). *Team Building: The Potential for Children International.* Workshop for Children International Employees at the National Headquarters office in

Kansas City, KS.

- Fry, M. D.** (2015). *Activities and Strategies to Help Children and Adolescents Thrive in Physical Activity Settings*. Topeka Parks and Recreation Conference; Topeka, KS.
- Fry, M. D.** (2015). *Fostering Wellness at the Worksites*. Live Well Lawrence; Lawrence, KS.
- Fry, M. D.** (2011, Nov.). Guest panelist for KU Alternative Breaks, University of KS
- Fry, M. D.** (2011, Nov.). Guest speaker for Multicultural Education, University of KS.
- Fry, M. D.** (2011, Nov.). Guest speaker for Coaching Football Class, University of KS.
- Fry, M. D.** (2011, Oct.). Guest speaker for KU Bowling Team, University of KS.
- Fry, M. D.** (2011, April). Guest speaker for Positive Psychology Class, University of KS.
- Fry, M. D.** (2011, March). Guest speaker for Coaching Softball Class, University of KS.
- Fry, M.D.** (2011, Feb.). Guest speaker for Coaches Meeting for Sunflower Soccer Association, Topeka, KS.
- Fry, M. D.** (2010). Guest speaker for Healthy Musicians Class (2-hour workshop), University of KS.
- Fry, M. D.** (2009). Guest speaker for Life Skills Class at Atchison Community High School, KS.
- Fry, M. D.** (2005, Feb.). Caring communities within physical activity settings. An invited presentation to a Memphis Chapter of the Philanthropic Educational Organization.
- Fry, M. D.** (2001-present). Coordinate mental skills and physical activities for youngsters (i.e., cancer patients & their siblings) at Target House in Memphis, TN. Have conducted approximately 12 1.5-2 hour sessions.
- Fry, M. D.** (2002, July 17th). The role of sport psychology in the prevention of and rehabilitation after injury. A presentation for coaches attending the Memphis Interscholastic Athletic Association Conference.
- Fry, M. D.** (May, 2002). Presented stress management session for Cancer Support Group at Pentecostal Church in Memphis, TN.
- Fry, M. D.** (2001-present). Coordinate mental skills and physical activities for youngsters (i.e., cancer patients & their siblings).
- Fry, M. D.** (2000 & 2001, March-April). Coordinator for Short Putts to Spring Workshops for the MidSouth Junior Golf Association. Presenter for 2 of the 5 workshops on team building skills.
- Fry, M. D.** (1996). Optimizing arousal levels in tennis. A presentation to the Women's tennis team at The University of Memphis.
- Fry, M. D.** (1995, October). *Mental skills training in track and field*. A presentation to the Women's track and cross country teams at The University of Memphis.
- Walling, M. D.** (1995, February). *Maximizing your children's motivation in swimming: An educational sport psychology perspective*. A presentation to the Booster Club parents of the University of Memphis Swim Club.
- Walling, M. D.** (1995, February). *Fostering effort and enjoyment with your tennis players: A sport psychology perspective*. An invited talk which was part of a workshop sponsored by the USTA, the National Umpires Association and the Memphis City Schools for high school tennis coaches.
- Walling, M. D.** (1994). *Sport psychology with a developmental twist*. An invited presentation to the Sport Psychology Colloquium, Department of Psychology, University of Memphis.
- Walling, M. D.** (1993, October). *The influence of parents on young gymnasts' levels of stress and motivation*. An invited presentation sponsored by the United States Gymnastics Federation, Indianapolis, IN.

Walling, M. D.(1992, October). *The mechanics of sport psychology: What we do and how it impacts you and your family*. Presentation to the Purdue Mechanical Engineering Advisory Board Spouses.

Walling, M. D. (1991, July). *Stress Management*. Invited presentation sponsored by the National Institute for Fitness and Sport.

Walling, M. D., & Newton, M. (1991, October). *Sport Psychology for the Weekend Athlete*. Invited presentation sponsored by the Eli Lilly Corporation, Indianapolis, IN.

Departmental/University Service

KU Faculty Research Grant Review Committee (2021-2023)

Wolfe Teaching Award, School of Education (2021)

KU Title IX Committee (2020)

Kansas Women's Leadership Institute, Net-Walk Mentor Participant (2016-2017).

KU Certificate in Sport Committee (2017-2018).

KU Center for Undergraduate Research, Advisory Board (2016-2018).

KU Calendar Committee (2016-2018; Chair, 2017-2019).

SOE Scholarship & Awards Committee (2013-2019).

SOE Convocation Volunteer (2009-present).

HSES Faculty Search Committees (2009, 2010, 2012, 2013, 2014, 2015).

HSES Scholarship & Awards Committee (2010-2013), University of Kansas.

HSES Personnel Committee (2011-present), University of Kansas.

HSES Graduate Curriculum Committee (2008-2014), University of Kansas.

SOE Diversity Committee (2013-2016), University of Kansas.

SOE Technology Committee (2011-2013), University of Kansas.

SOE Governance Committee (2011-2013), University of Kansas.

SOE Personnel Committee (2007-2010), University of Kansas.

University of Kansas, Dean of the School of Education 5-year Review Committee (2014).

President's Tenure & Promotions Appeal Committee. (2007-2009). The University of Memphis.

HSS Community Affairs Committee (2004-2006). The University of Memphis.

Coordinator of Achievement Motivation Seminar (2003). The University of Memphis, Dept. HMSE.

PETE Unit Head, Dept. of HMSE, University of Memphis (2001-2003).

HMSE Tenure and Promotion Committee (1999-2000; Chair 2000-2001), The University of Memphis.

HMSE Coordinator for the Science Olympiad sponsored by The University of Memphis for high school honor science students in the Western portion of TN (1995-1999).

Dean's Council for Teacher Education (1994-1995), University of Memphis.

HMSE Material Resources Committee (1994-1995; 1998-2000, 2002; 2000-2001, Chair), University of Memphis.

HMSE Ad Hoc Committee on Internships (1994-1995), University of Memphis.

HMSE Recruitment Committee (1995-1996).

HMSE Physical Education Teacher Education Unit (1994-present; Unit Head-2001-2002), University of Memphis.

HMSE Ad Hoc Committee on Proposing a PhD Program (1995-1997).

HMSE Undergraduate Council (1994-95 & 1997-1998)

HMSE Academic Council (1996-1998).

HMSE Graduate Studies and Research Council (1995-2001; chair from 1996-1998)

College of Education Graduate Council (1996-1998).

Graduate Coordinator for the Department of Human Movement Sciences and Education, (1996-1998).

Service to National Organizations

Creating a Caring Climate Within and Across an Athletic Program, Positive Coaching Alliance Workshop (2020).

Subject Matter Expert for the Certification Exam Committee, Association of Applied Sport Psychology (2018).

Member of Ad-Hoc Committee to Study Future of AASP, Association of Applied Sport Psychology (2012-2015).

Member of the Social Psychology Section Committee, Association for the Advancement of Applied Sport Psychology (AAASP). Appointed for a 3-year-term, 1996-99; 2001-2003.

Member of AAASP Dissertation Award Committee (1998 & 2002).

Member of Editorial Board for *Physical Activity Today* (American Alliance for Health, Physical Education, Recreation and Dance publication), 1997-2001.

Member of Sport Psychology Program Area Review Committee for the 1996 Annual Meeting of the North American Society for the Psychology of Sport and Physical Activity (NASPSA).

Executive Board Member, Association for the Advancement of Applied Sport Psychology, (2004-2006).

Member of Program Review Committee, American Alliance of Health, Physical Education, Recreation & Dance (2009- 2017); Chaired committee in 2010.

Member of Program Review Committee, Association for Applied Sport Psychology (2008-present).

Reviewing/Editing Responsibilities

Associate Editor (2009-2012); Editorial Board Member (2000-2009; 2013-present) and Reviewer (1992-1999). *Journal of Applied Sport Psychology*.

Associate Editor. *Sport Psychology in Action* (2008-present).

Editorial Board Member. *Sport, Exercise, and Performance Psychology* (2011-present; American Psychological Association Journal).

Sport & Exercise Psychology Section Editor (2003-2006) and Reviewer (1994-present). *Research Quarterly for Exercise and Sport*.

Co-editor with David R. Black of Abstracts Column. *Peer Facilitator Quarterly* (1993-1994).

Reviewer. *Education and Treatment of Children* (1993-1995).

Reviewer. *Journal of Health Education* (1993-1995).

Reviewer. *The Sports Psychologist* (1997-present).

Reviewer. *International Journal of Sport Psychology*. (1997-present).

Reviewer. *Journal of Sport and Exercise Psychology* (1993-present).

Reviewer. *Journal of Strength and Conditioning* (1998-present).

Reviewer & Editorial Board Member. *Journal of Strength and Conditioning Research* (Reviewer, 1996-present; Editorial Board Member, 1996-1998).

Contributor to Community/National Forum

- Fry, M. D., & Brown, T. C.** (2021-present). Co-Directors of Strong Girls, an after-school physical activity and lifeskill program for adolescent girls. University of Kansas.
- Fry, M. D.** (Fall, 2017). *Participating in a Positive Sport Climate Reaps Many Benefits for Young People*. Column written for the National Dropout Prevention Coalition-Newsletter.
- Fry, M. D.** (2017). *The Power of the Positive*. Contributor to the Positive Coaching Alliance Video.
- DeAngelis, T. (2016) *Psychologists' research points ways to keep youth athletes in sports*. American Psychological Association Monitor Newsletter [KU Sport & Exercise Psychology Lab featured]
- Fry, M.D.** (2003). *Coaches' rant can bench kids for life*. Invited guest column in the Viewpoint Section of the Commercial Appeal, April 7, 2003.
- Fry, M.D.** (2003, March). *Strategies for creating a task-involving climate with underserved youth*. An invited presentation to the Dept. of EXSS at the University of Mississippi.
- Fry, M.D.** (2002). Presenter of workshop entitled: *The Climate Counts: Techniques and Strategies for Fostering a Task-Involving Motivational Climate*.
- Fry, M. D., & Newton, M. L.** (1997, December). *TARGETing success in volleyball: Creating a positive motivational climate*. Invited speaker at the American Volleyball Coaches Association (AVCA) National Convention preceding the NCAA Final Four Tournament in Spokane, WA.
- Fry, M. D.** (1996, April). Invited speaker at Colonial Junior High's Career Day.
- Fry, M. D.** (February, 1995 & October, 1996). Invited guest on Eddie Cantler's talk-show, "The Trainer's Corner" seen on the Library Channel, Memphis, TN.
- Walling, M. D.** (1995). Choosing quality youth sport programs for children: The critical role of parents. *Journal of Kinetic Arts, 1* (5).

Applied Sport Psychology Experiences

- Fry, M. D. (2008-present). Mental Skills Interventions with high school & university athletes.
- Fry, M. D. (2013-2018). Mental Skills Intervention with a high school baseball team.
- Fry, M. D. (2009-2011). Mental Skills Intervention with a youth baseball team.
- Fry, M. D. (2008-2010). Mental Skills Intervention with a Division 1 collegiate volleyball team.
- Fry, M.D. (2006-2007). Mental Skills Intervention with a high school basketball team.
- Fry, M. D. (2006). Mental Skills Intervention with a Division 1 cross country team.
- Fry, M.D. (2005-2006). Mental Skills activities with a high school golfer.
- Fry, M.D. (2003). Mental Skills Activities provided to the Dolphins, a youth synchronized swim program in Memphis.
- Fry, M.D. (2001-2007). Mental Skills Games and Activities Sessions provided to residents of Target House (i.e., long-term treatment patients at St. Jude Hospital).
- Fry, M. D. (2001, Spring). The Strength Club. An after-school mental skills training program for elementary-aged children.
- Fry, M. D. (1996, Spring). Consultation with members of a Division 1 collegiate Track and Field Team.

Walling, M. D. (1994, December). Member of Sport Psychology Coaching Staff for the Talent Opportunity Program (TOP) Camp sponsored by the United States Gymnastics Federation (USGF). Tulsa, OK

Walling, M. D. (1992, October). *Effective Goal Setting in Volleyball*. Presentation to the West Lafayette High School Volleyball Team.

Walling, M. D. (1992, April). *Stress Management in Sport*. Presentation to the Women's Crew Team, Purdue University.

Walling, M. D. (1992). Consultation with High School Tennis Player Over a Season.

Chair, Graduate Student Advisory Council, Department of Health, Kinesiology, and Leisure Studies at Purdue University, 1991-1992.

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA
CHARLESTON DIVISION

B.P.J., by her next friend and mother,
HEATHER JACKSON,

Plaintiff,

vs.

WEST VIRGINIA STATE BOARD OF
EDUCATION; HARRISON COUNTY BOARD
OF EDUCATION; WEST VIRGINIA
SECONDARY SCHOOLS ACTIVITIES
COMMISSION; W. CLAYTON BURCH, in his
official capacity as State Superintendent, DORA
STUTLER, in her official capacity as the
Harrison County Superintendent, and the
STATE OF WEST VIRGINIA,

Defendants,

and

LAINIEY ARMISTEAD,

Defendant-Intervenor.

Case No. 2:21-cv-00316

Hon. Joseph R. Goodwin

DECLARATION OF GREGORY A. BROWN, PH.D., FACSM

I, Dr. Gregory A. Brown, pursuant to 28 U.S. Code § 1746, declare under penalty of perjury under the laws of the United States of America that the facts contained in my Expert Declaration of Gregory A. Brown, Ph.D., FACSM in the Case of B.P.J. v. West Virginia State Board of Education, attached hereto, are true and correct to the best of my knowledge and belief, and that the opinions expressed therein represent my own expert opinions.

Executed on February 23, 2022.



Gregory A. Brown

G. Brown

Expert Report, B.P.J. v. WV BOE et al.

G. Brown

Expert Report, B.P.J. v. WV BOE et al.

Expert Report of
Gregory A Brown, Ph.D. FACSM
In the case of B.P.J. vs. West Virginia State Board of Education.

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Personal Qualifications and Disclosure

I serve as Professor of Exercise Science in the Department of Kinesiology and Sport Sciences at the University of Nebraska Kearney, where I teach classes in Exercise Physiology among other topics. I am also the Director of the General Studies program. I have served as a tenured (and nontenured) professor at universities since 2002.

In August 2002, I received a Doctor of Philosophy degree from Iowa State University, where I majored in Health and Human Performance, with an emphasis in the Biological Bases of Physical Activity. In May 1999, I received a Master of Science degree from Iowa State University, where I majored in Exercise and Sport Science, with an emphasis in Exercise Physiology.

I have received many awards over the years, including the Mortar Board Faculty Excellence Honors Award, College of Education Outstanding Scholarship / Research Award, and the College of Education Award for Faculty Mentoring of Undergraduate Student Research. I have authored more than 40 refereed publications and more than 50 refereed presentations in the field of Exercise Science. I have authored chapters for multiple books in the field of Exercise Science. And I have served as a peer reviewer for over 25 professional journals, including *The American Journal of Physiology*, the *International Journal of Exercise Science*, the *Journal of Strength and Conditioning Research*, and *The Journal of Applied Physiology*.

My areas of research have included the endocrine response to testosterone prohormone supplements in men and women, the effects of testosterone prohormone supplements on health and the adaptations to strength training in men, the effects of energy drinks on the physiological response to exercise, and assessment of various athletic training modes in males and females. Articles that I have published that are closely related to topics that I discuss in this white paper include:

- Studies of the effect of ingestion of a testosterone precursor on circulating testosterone levels in young men. Douglas S. King, Rick L. Sharp, Matthew D. Vukovich, Gregory A. Brown, et al., *Effect of Oral Androstenedione on Serum Testosterone and Adaptations to Resistance Training in Young Men: A Randomized Controlled Trial*, JAMA 281: 2020-2028 (1999); G. A. Brown, M. A. Vukovich, et al., *Effects of Anabolic Precursors on Serum Testosterone Concentrations and Adaptations to Resistance Training in Young Men*, INT J SPORT NUTR EXERC METAB 10: 340-359 (2000).
- A study of the effect of ingestion of that same testosterone precursor on circulating testosterone levels in young women. G. A. Brown, J. C. Dewey, et

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Expert Report, B.P.J. v. WV BOE et al.

al., *Changes in Serum Testosterone and Estradiol Concentrations Following Acute Androstenedione Ingestion in Young Women*, HORM METAB RES 36: 62-66 (2004.)

- A study finding (among other things) that body height, body mass, vertical jump height, maximal oxygen consumption, and leg press maximal strength were higher in a group of physically active men than comparably active women, while the women had higher percent body fat. G. A. Brown, Michael W. Ray, et al., *Oxygen Consumption, Heart Rate, and Blood Lactate Responses to an Acute Bout of Plyometric Depth Jumps in College-Aged Men And Women*, J. STRENGTH COND RES 24: 2475-2482 (2010).
- A study finding (among other things) that height, body mass, and maximal oxygen consumption were higher in a group of male NCAA Division 2 distance runners, while women NCAA Division 2 distance runners had higher percent body fat. Furthermore, these male athletes had a faster mean competitive running speed (~3.44 min/km) than women (~3.88 min/km), even though the men ran 10 km while the women ran 6 km. Katherine Semin, Alvah C. Stahlnecker, Kate A. Heelan, G. A. Brown, et al, *Discrepancy Between Training, Competition and Laboratory Measures of Maximum Heart Rate in NCAA Division 2 Distance Runners*, JOURNAL OF SPORTS SCIENCE AND MEDICINE 7: 455-460 (2008).
- A presentation at the 2021 American Physiological Society New Trends in Sex and Gender Medicine Conference entitled “Transwomen Competing in Women’s Sports: What We Know and What We Don’t”. I have also authored an August 2021 entry for the American Physiological Society Physiology Educators Community of Practice Blog (PECOP Blog) titled “The Olympics, Sex, and Gender in the Physiology Classroom.”

A list of my published scholarly work for the past 10 years appears as an Appendix.

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Purpose of this Declaration

I have been asked by counsel for Defendant State of West Virginia and Intervenor Defendant Lainey Armistead in the matter of *B.P.J. by her next friend and mother Heather Jackson, v. State of West Virginia State Board of Education, et al.* to offer my opinions about the following: (a) whether males have inherent advantages in athletic performance over females, and if so the scale and physiological basis of those advantages, to the extent currently understood by science and (b) whether the sex-based performance advantage enjoyed by males is eliminated if feminizing hormones are administered to male athletes who identify as transgender (and in the case of prepubertal children, whether puberty blockers eliminate the advantage). In this declaration, when I use the terms “boy” or “male,” I am referring to biological males based on the individual’s reproductive biology and genetics as determined at birth. Similarly, when I use the terms “girl” or “female,” I am referring to biological females based on the individual’s reproductive biology and genetics as determined at birth. When I use the term transgender, I am referring to persons who are males or females, but who identify as a member of the opposite sex.

I have previously provided expert information in cases similar to this one in the form of a written declaration and a deposition in the case of *Soule vs. CIAC* in the state of Connecticut, and in the form of a written declaration in the case of *Hecox vs. Little* in the state of Idaho. I have not previously testified as an expert in any trials.

The opinions I express in this declaration are my own, and do not necessarily reflect the opinions of my employer, the University of Nebraska.

I have been compensated for my time serving as an expert in this case at the rate of \$150 per hour. My compensation does not depend on the outcome in the case.

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Overview

In this declaration, I explore three important questions relevant to current discussions and policy decisions concerning inclusion of transgender individuals in women's athletic competitions. Based on my professional familiarity with exercise physiology and my review of the currently available science, including that contained in the many academic sources I cite in this report, I set out and explain three basic conclusions:

- At the level of (a) elite, (b) collegiate, (c) scholastic, and (d) recreational competition, men, adolescent boys, or male children, have an advantage over equally aged, gifted, and trained women, adolescent girls, or female children in almost all athletic events;
- Biological male physiology is the basis for the performance advantage that men, adolescent boys, or male children have over women, adolescent girls, or female children in almost all athletic events; and
- The administration of androgen inhibitors and cross-sex hormones to men or adolescent boys after the onset of male puberty does not eliminate the performance advantage that men and adolescent boys have over women and adolescent girls in almost all athletic events. Likewise, there is no published scientific evidence that the administration of puberty blockers to males before puberty eliminates the pre-existing athletic advantage that prepubertal males have over prepubertal females in almost all athletic events.

In short summary, men, adolescent boys, and prepubertal male children perform better in almost all sports than women, adolescent girls, and prepubertal female children because of their inherent physiological advantages. In general, men, adolescent boys, and prepubertal male children, can run faster, output more muscular power, jump higher, and possess greater muscular endurance than women, adolescent girls, and prepubertal female children. These advantages become greater during and after male puberty, but they exist before puberty.

Further, while after the onset of puberty males are on average taller and heavier than females, a male performance advantage over females has been measured in weightlifting competitions even between males and females matched for body mass.

Male advantages in measurements of body composition, tests of physical fitness, and athletic performance have also been shown in children before puberty. These advantages are magnified during puberty, triggered in large part by the higher testosterone concentrations in men, and adolescent boys, after the onset of

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male puberty. Under the influence of these higher testosterone levels, adolescent boys and young men develop even more muscle mass, greater muscle strength, less body fat, higher bone mineral density, greater bone strength, higher hemoglobin concentrations, larger hearts and larger coronary blood vessels, and larger overall statures than women. In addition, maximal oxygen consumption ($VO_2\text{max}$), which correlates to ~30-40% of success in endurance sports, is higher in both elite and average men and boys than in comparable women and girls when measured in regard to absolute volume of oxygen consumed and when measured relative to body mass.

Although androgen deprivation (that is, testosterone suppression) may modestly decrease some physiological advantages that men and adolescent boys have over women and adolescent girls, it cannot fully or even largely eliminate those physiological advantages once an individual has passed through male puberty.

Evidence and Conclusions

I. The scientific reality of biological sex

1. The scientific starting point for the issues addressed in this report is the biological fact of dimorphic sex in the human species. It is now well recognized that dimorphic sex is so fundamental to human development that, as stated in a recent position paper issued by the Endocrine Society, it “must be considered in the design and analysis of human and animal research. . . . Sex is dichotomous, with sex determination in the fertilized zygote stemming from unequal expression of sex chromosomal genes.” (Bhargava et al. 2021 at 220). As stated by Sax (2002 at 177), “More than 99.98% of humans are either male or female.” All humans who do not suffer from some genetic or developmental disorder are unambiguously male or female.

2. Although sex and gender are used interchangeably in common conversation, government documents, and in the scientific literature, the American Psychological Association defines sex as “physical and biological traits” that “distinguish between males and females” whereas gender “implies the psychological, behavioral, social, and cultural aspects of being male or female (i.e., masculinity or femininity)” (<https://dictionary.apa.org>, accessed January 14, 2022). The concept that sex is an important biological factor determined at conception is a well-established scientific fact that is supported by statements from a number of respected organizations including, but not limited to, the Endocrine Society (Bhargava et al. 2021 at 220), the American Physiological Society (Shah 2014), the Institute of Medicine, and the National Institutes of Health (Miller 2014 at H781-82). Collectively, these and other organizations have stated that every cell has a sex

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and every system in the body is influenced by sex. Indeed, “sex often influences gender, but gender cannot influence sex.” (Bhargava 2021 at 228.)

3. To further explain: “The classical biological definition of the **2 sexes** is that females have ovaries and make larger female gametes (eggs), whereas males have testes and make smaller male gametes (sperm) ... the definition can be extended to the ovaries and testes, and in this way the categories—female and male—can be applied also to individuals who have gonads but do not make gametes ... sex is dichotomous because of the different roles of each sex in reproduction.” (Bhargava 2021 at 221.) Furthermore, “sex determination begins with the inheritance of XX or XY chromosomes” (Bhargava 2021 at 221.) And, “Phenotypic sex differences develop in XX and XY embryos as soon as transcription begins. The categories of X and Y genes that are unequally represented or expressed in male and female mammalian zygotes ... cause phenotypic sex differences” (Bhargava 2021 at 222.)

4. Although disorders of sexual development (DSDs) are sometimes confused with discussions of transgender individuals, the two are different phenomena. DSDs are disorders of physical development. Many DSDs are “associated with genetic mutations that are now well known to endocrinologists and geneticists.” (Bhargava 2021 at 225) By contrast, a sense of transgender identity is usually not associated with any physical disorder, and “a clear biological causative underpinning of gender identity remains to be demonstrated.” (Bhargava 2021 at 226.)

5. Further demonstrating the biological importance of sex, Gershoni and Pietrokovski (2017) detail the results of an evaluation of “18,670 out of 19,644 informative protein-coding genes in men versus women” and reported that “there are over 6500 protein-coding genes with significant S[ex]D[ifferential] E[xpression] in at least one tissue. Most of these genes have SDE in just one tissue, but about 650 have SDE in two or more tissues, 31 have SDE in more than five tissues, and 22 have SDE in nine or more tissues” (Gershoni 2017 at 2-3.) Some examples of tissues identified by these authors that have SDE genes include breast mammary tissue, skeletal muscle, skin, thyroid gland, pituitary gland, subcutaneous adipose, lung, and heart left ventricle. Based on these observations the authors state “As expected, Y-linked genes that are normally carried only by men show SDE in many tissues” (Gershoni 2017 at 3.) A stated by Heydari et al. (2022, at 1), “Y chromosome harbors male-specific genes, which either solely or in cooperation with their X-counterpart, and independent or in conjunction with sex hormones have a considerable impact on basic physiology and disease mechanisms in most or all tissues development.”

6. In a review of 56 articles on the topic of sex-based differences in skeletal muscle, Haizlip et al., (2015) state that “More than 3,000 genes have been

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identified as being differentially expressed between male and female skeletal muscle.” (Haizlip 2015 at 30.) Furthermore, the authors state that “Overall, evidence to date suggests that skeletal muscle fiber-type composition is dependent on species, anatomical location/function, and sex” (Haizlip 2015 at 30.) The differences in genetic expression between males and females influence the skeletal muscle fiber composition (i.e. fast twitch and fast twitch sub-type and slow twitch), the skeletal muscle fiber size, the muscle contractile rate, and other aspects of muscle function that influence athletic performance. As the authors review the differences in skeletal muscle between males and females they conclude, “Additionally, all of the fibers measured in men have significantly larger cross-sectional areas (CSA) compared with women.” (Haizlip 2015 at 31.) The authors also explore the effects of thyroid hormone, estrogen, and testosterone on gene expression and skeletal muscle function in males and females. One major conclusion by the authors is that “The complexity of skeletal muscle and the role of sex adding to that complexity cannot be overlooked.” (Haizlip 2015 at 37.) The evaluation of SDE in protein coding genes helps illustrate that the differences between men and women are intrinsically part of the chromosomal and genetic makeup of humans which can influence many tissues that are inherent to the athletic competitive advantages of men compared to women.

II. Biological men, or adolescent boys, have large, well-documented performance advantages over women and adolescent girls in almost all athletic contests.

7. It should scarcely be necessary to invoke scientific experts to “prove” that men are on average larger, stronger, and faster than women. All of us, along with our siblings and our peers and perhaps our children, have passed through puberty, and we have watched that differentiation between the sexes occur. This is common human experience and knowledge.

8. Nevertheless, these differences have been extensively studied and measured. I cited many of these studies in the first paper on this topic that I prepared, which was submitted in litigation in January 2020. Since then, in light of current controversies, several authors have compiled valuable collections or reviews of data extensively documenting this objective fact about the human species, as manifest in almost all sports, each of which I have reviewed and found informative. These include Coleman (2020), Hilton & Lundberg (2021), World Rugby (2020), Harper (2021), Hamilton (2021), and a “Briefing Book” prepared by the Women’s Sports Policy Working Group (2021). The important paper by Handelsman et al. (2018) also gathers scientific evidence of the systematic and large male athletic advantage.

9. These papers and many others document that men, adolescent boys, and prepubertal male children, substantially outperform comparably aged women,

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adolescent girls and prepubertal female children, in competitions involving running speed, swimming speed, cycling speed, jumping height, jumping distance, and strength (to name a few, but not all, of the performance differences). As I discuss later, it is now clear that these performance advantages for men, adolescent boys, and prepubertal male children, are inherent to the biological differences between the sexes.

10. In fact, I am not aware of any scientific evidence today that disproves that after puberty men possess large advantages in athletic performance over women—so large that they are generally insurmountable for comparably gifted and trained athletes at every level (i.e. (a) elite, (b) collegiate, (c) scholastic, and (d) recreational competition). And I am not aware of any scientific evidence today that disproves that these measured performance advantages are at least largely the result of physiological differences between men and women which have been measured and are reasonably well understood.

11. My use of the term “advantage” in this paper must not be read to imply any normative judgment. The adult female physique is simply different from the adult male physique. Obviously, it is optimized in important respects for the difficult task of childbearing. On average, women require far fewer calories for healthy survival. Evolutionary biologists can and do theorize about the survival value or “advantages” provided by these and other distinctive characteristics of the female physique, but I will leave that to the evolutionary biologists. I use “advantage” to refer merely to performance advantages in athletic competitions.

12. I find in the literature a widespread consensus that the large performance and physiological advantages possessed by males—rather than social considerations or considerations of identity—are precisely the *reason* that most athletic competitions are separated by sex, with women treated as a “protected class.” To cite only a few statements accepting this as the justification:

- Handelsman et al. (2018) wrote, “Virtually all elite sports are segregated into male and female competitions. The main justification is to allow women a chance to win, as women have major disadvantages against men who are, on average, taller, stronger, and faster and have greater endurance due to their larger, stronger, muscles and bones as well as a higher circulating hemoglobin level.” (803)
- Millard-Stafford et al. (2018) wrote “Current evidence suggests that women will not swim or run as fast as men in Olympic events, which speaks against eliminating sex segregation in these individual sports” (530) “Given the historical context (2% narrowing in swimming over 44 y), a reasonable assumption might be that no more than 2% of the

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current performance gap could still potentially be attributed to sociocultural influences.”, (533) and “Performance gaps between US men and women stabilized within less than a decade after federal legislation provided equal opportunities for female participation, but only modestly closed the overall gap in Olympic swimming by 2% (5% in running).” (533) Dr. Millard-Stafford, a full professor at Georgia Tech, holds a Ph.D. in Exercise Physiology and is a past President of the American College of Sports Medicine.

- In 2021, Hilton et al. wrote, “most sports have a female category the purpose of which is the protection of both fairness and, in some sports, safety/welfare of athletes who do not benefit from the physiological changes induced by male levels of testosterone from puberty onwards.” (204)
- In 2020 the Swiss High Court (“Tribunal Fédéral”) observed that “in most sports . . . women and men compete in two separate categories, because the latter possess natural advantages in terms of physiology.”¹
- The members of the Women’s Sports Policy Working Group wrote that “If sports were not sex-segregated, female athletes would rarely be seen in finals or on victory podiums,” and that “We have separate sex sport and eligibility criteria based on biological sex because this is the only way we can assure that female athletes have the same opportunities as male athletes not only to participate but to win in competitive sport. . . . If we did not separate athletes on the basis of biological sex—if we used any other physical criteria—we would never see females in finals or on podiums.” (WSPWG Briefing Book 2021 at 5, 20.)
- In 2020, the World Rugby organization stated that “the women's category exists to ensure protection, safety and equality for those who do not benefit from the biological advantage created by these biological performance attributes.” (World Rugby Transgender Women Guidelines 2020.)
- In 2021 Harper et al. stated “...the small decrease in strength in transwomen after 12–36 months of GAHT [Gender Affirming Hormone Therapy] suggests that transwomen likely retain a strength advantage

¹ “dans la plupart des sports . . . les femmes et les hommes concourent dans deux catégories séparées, ces derniers étant naturellement avantagés du point de vue physique.” Tribunal Fédéral decision of August 25, 2020, Case 4A_248/2019, 4A_398/2019, at §9.8.3.3.

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over cisgender women.” (7) and “...observations in trained transgender individuals are consistent with the findings of the current review in untrained transgender individuals, whereby 30 months of GAHT may be sufficient to attenuate some, but not all, influencing factors associated with muscular endurance and performance.” (8)

- Hamilton et al. (2021), in a consensus statement for the International Federation of Sports Medicine (FIMS) concluded that “Transwomen have the right to compete in sports. However, cisgender women have the right to compete in a protected category.” (1409)

13. While the sources I mention above gather more extensive scientific evidence of this uncontroversial truth, I provide here a brief summary of representative facts concerning the male advantage in athletic performance.

A. Men are stronger.

14. Males exhibit greater strength throughout the body. Both Handelsman et al. (2018) and Hilton & Lundberg (2021) have gathered multiple literature references that document this fact in various muscle groups.

15. Men have in the neighborhood of 60%-100% greater **arm strength** than women. (Handelsman 2018 at 812.)² One study of elbow flexion strength (basically, bringing the fist up towards the shoulder) in a large sample of men and women found that men exhibited 109% greater isometric strength, and 89% higher strength in a single repetition. (Hilton 2021 at 204, summarizing Hubal (2005) at Table 2.)

16. **Grip strength** is often used as a useful proxy for strength more generally. In one study, men showed on average 57% greater grip strength than women. (Bohannon 2019.) A wider meta-analysis of multiple grip-strength studies not limited to athletic populations found that 18- and 19-year-old males exhibited in

² Handelsman expresses this as women having 50% to 60% of the “upper limb” strength of men. Handelsman cites Sale, *Neuromuscular function*, for this figure and the “lower limb” strength figure. Knox et al., *Transwomen in elite sport* (2018) are probably confusing the correct way to state percentages when they state that “differences lead to decreased trunk and lower body strength by 64% and 72% respectively, in women” (397): interpreted literally, this would imply that men have **almost 4x as much** lower body strength as do women.

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the neighborhood of 2/3 greater grip strength than females. (Handelsman 2017 Figure 3, summarizing Silverman 2011 Table 1.)³

17. In an evaluation of maximal isometric handgrip strength in 1,654 healthy men, 533 healthy women aged 20-25 years and 60 “highly trained elite female athletes from sports known to require high hand-grip forces (judo, handball),” Leyk et al. (2007) observed that, “The results of female national elite athletes even indicate that the strength level attainable by extremely high training will rarely surpass the 50th percentile of untrained or not specifically trained men.” (Leyk 2007 at 415.)

18. Men have in the neighborhood of 25%-60% greater **leg strength** than women. (Handelsman 2018 at 812.) In another measure, men exhibit 54% greater knee extension torque and this male leg strength advantage is consistent across the lifespan. (Neder 1999 at 120-121.)

19. When male and female Olympic weightlifters of the same body weight are compared, the top males lift weights between 30% and 40% greater than the females of the same body weight. But when top male and female performances are compared in powerlifting, without imposing any artificial limitations on bodyweight, the male record is 65% higher than the female record. (Hilton 2021 at 203.)

20. In another measure that combines many muscle groups as well as weight and speed, moderately trained males generated 162% greater punching power than females even though men do not possess this large an advantage in any single bio-mechanical variable. (Morris 2020.) This objective reality was subjectively summed up by women’s mixed-martial arts fighter Tamikka Brents, who suffered significant facial injuries when she fought against a biological male who identified as female and fought under the name of Fallon Fox. Describing the experience, Brents said:

“I’ve fought a lot of women and have never felt the strength that I felt in a fight as I did that night. I can’t answer whether it’s because she was born a man or not because I’m not a doctor. I can only say, I’ve never felt so overpowered ever in my life, and I am an abnormally strong female in my own right.”⁴

³ Citing Silverman, *The secular trend for grip strength in Canada and the United States*, J. Ports Sci. 29:599-606 (2011).

⁴ <http://whoatv.com/exclusive-fallon-foxs-latest-opponent-opens-up-to-whoatv/> (last accessed October 5, 2021).

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B. Men run faster.

21. Many scholars have detailed the wide performance advantages enjoyed by men in running speed. One can come at this reality from a variety of angles.

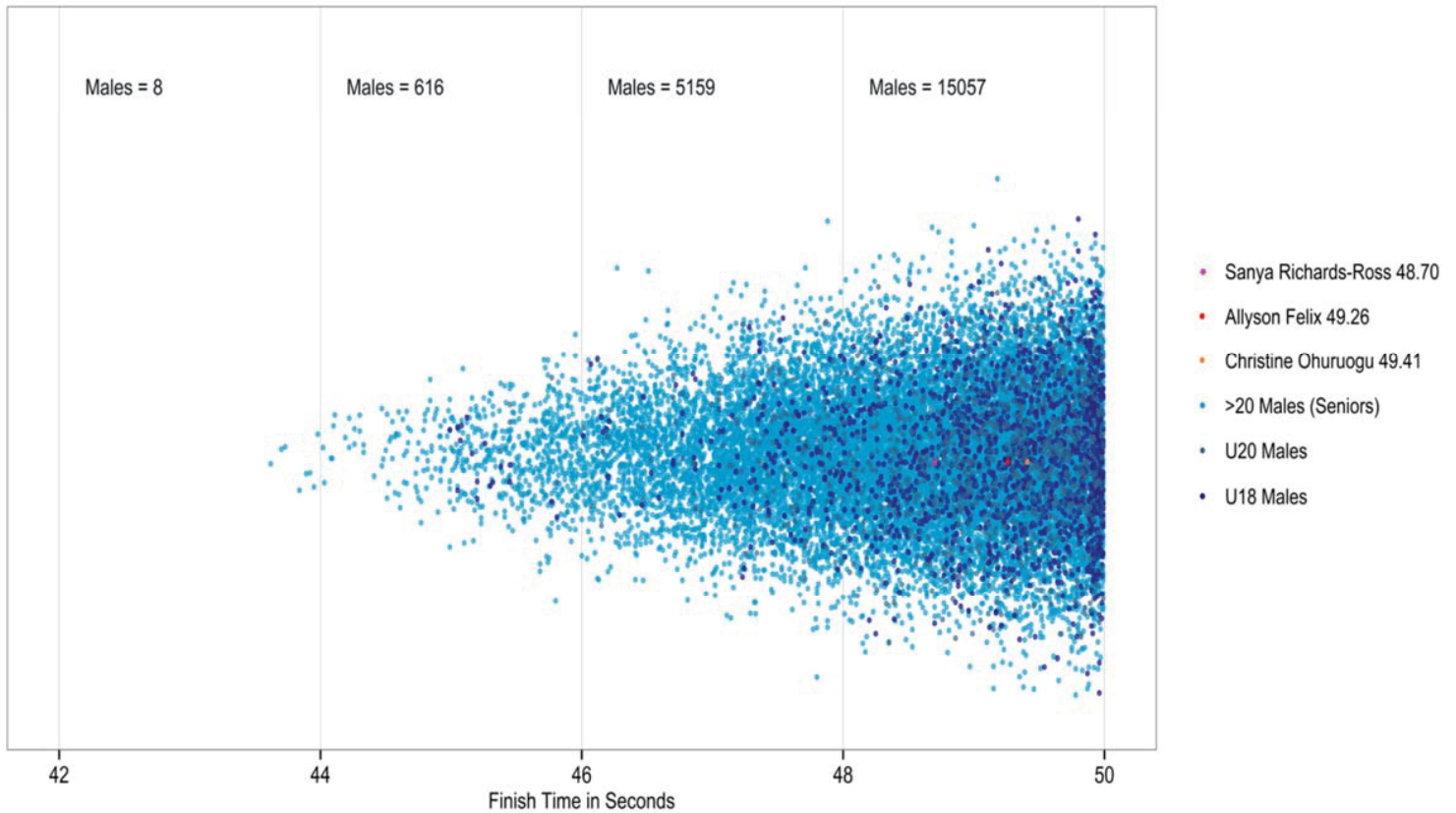
22. Multiple authors report a male speed advantage in the neighborhood of 10%-13% in a variety of events, with a variety of study populations. Handelsman et al. 2018 at 813 and Handelsman 2017 at 70 both report a male advantage of about 10% by age 17. Thibault et al. 2010 at 217 similarly reported a stable 10% performance advantage across multiple events at the Olympic level. Tønnessen et al. (2015 at 1-2) surveyed the data and found a consistent male advantage of 10%-12% in running events after the completion of puberty. They document this for both short sprints and longer distances. One group of authors found that the male advantage increased dramatically in ultra-long-distance competition (Lepers & Knechtle 2013.)

23. A great deal of current interest has been focused on track events. It is worth noting that a recent analysis of publicly available sports federation and tournament records found that men enjoy the *least* advantage in running events, as compared to a range of other events and metrics, including jumping, pole vaulting, tennis serve speed, golf drives, baseball pitching speed, and weightlifting. (Hilton 2021 at 201-202.) Nevertheless, as any serious runner will recognize, the approximately 10% male advantage in running is an overwhelming difference. Dr. Hilton calculates that “approximately 10,000 males have personal best times that are faster than the current Olympic 100m female champion.” (Hilton 2021 at 204.) Professors Doriane Coleman, Jeff Wald, Wickliffe Shreve, and Richard Clark dramatically illustrated this by compiling the data and creating the figure below (last accessed on February 10, 2022, at <https://bit.ly/35yOyS4>), which shows that the *lifetime best performances* of three female Olympic champions in the 400m event—including Team USA’s Sanya Richards-Ross and Allyson Felix—would not match the performances of “literally thousands of boys and men, including thousands who would be considered second tier in the men’s category” *just in 2017 alone*: (data were drawn from the International Association of Athletics Federations (IAAF) website which provides complete, worldwide results for individuals and events, including on an annual and an all-time basis).

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Personal Bests for 3 Female Gold Medalists versus 2017 Performances by Boys and Men



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24. Professor Coleman and her colleague Wicklyffe Shreve also created the table below (last accessed on February 10, 2022, at <https://bit.ly/37E1s2X>), which “compares the number of men—males over 18—competing in events reported to the International Association of Athletics Federation whose results in each event in 2017 would have ranked them above the very best elite woman that year.”

TABLE 2 – World’s Best Woman v. Number of Men Outperforming			
Event	Best Women’s Result	Best Men’s Result	# of Men Outperforming
100 Meters	10.71	9.69	2,474
200 Meters	21.77	19.77	2,920
400 Meters	49.46	43.62	4,341
800 Meters	1:55.16*	1:43.10	3,992+
1500 Meters	3:56.14	3:28.80	3,216+
3000 Meters	8:23.14	7:28.73	1307+
5000 Meters	14:18.37	12:55.23	1,243
High Jump	2.06 meters	2.40 meters	777
Pole Vault	4.91 meters	6.00 meters	684
Long Jump	7.13 meters	8.65 meters	1,652
Triple Jump	14.96 meters	18.11 meters	969

25. The male advantage becomes insuperable well before the developmental changes of puberty are complete. Dr. Hilton documents that even “schoolboys”—defined as age 15 and under—have beaten the female world records in running, jumping, and throwing events. (Hilton 2021 at 204.)

26. Similarly, Coleman and Shreve created the table below (last accessed on February 10, 2022, at <https://bit.ly/37E1s2X>), which “compares the number of boys—males under the age of 18—whose results in each event in 2017 would rank them above the single very best elite [adult] woman that year:” data were drawn from the International Association of Athletics Federations (IAAF) website

TABLE 1 – World’s Best Woman v. Under 18 Boys			
Event	Best Women’s Result	Best Boys’ Result	# of Boys Outperforming
100 Meters	10.71	10.15	124 ⁺
200 Meters	21.77	20.51	182
400 Meters	49.46	45.38	285
800 Meters	1:55.16*	1:46.3	201+
1500 Meters	3:56.14	3:37.43	101+
3000 Meters	8:23.14	7:38.90	30
5000 Meters	14:18.37	12:55.58	15
High Jump	2.06 meters	2.25 meters	28
Pole Vault	4.91 meters	5.31 meters	10
Long Jump	7.13 meters	7.88 meters	74
Triple Jump	14.96 meters	17.30 meters	47

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27. In an analysis I have performed of running events (consisting of the 100 m, 200 m, 400 m, 800 m, 1500 m, 5000 m, and 10000 m) in the Division 1, Division 2, and Division 3 NCAA Outdoor track championships for the years of 2010-2019, the average performance across all events of the 1st place man was 14.1% faster than the 1st place woman, with the smallest difference being a 10.2% advantage for men in the Division 1 100 m race. The average 8th place man across all events (the last place to earn the title of All American) was 11.2% faster than 1st place woman, with the smallest difference being a 6.5% advantage for men in the Division 1 100 m race. (Brown et al. Unpublished observations, to be presented at the 2022 Annual Meeting of the American College of Sports Medicine.)

28. Athletic.net® is an internet-based resource providing “results, team, and event management tools to help coaches and athletes thrive.” Among the resources available on Athletic.net are event records that can be searched by nationally or by state age group, school grade, and state. Higerd (2021) in an evaluation of high school track running performance records from five states (CA, FL, MN, NY, WA), over three years (2017 – 2019) observed that males were 14.38% faster than females in the 100M (at 99), 16.17% faster in the 200M (at 100), 17.62% faster in the 400M (at 102), 17.96% faster in the 800M (at 103), 17.81% faster in the 1600M (at 105), and 16.83% faster in the 3200M (at 106).

C. Men jump higher and farther.

29. Jumping involves both leg strength and speed as positive factors, with body weight of course a factor working against jump height. Despite their substantially greater body weight, males enjoy an even greater advantage in jumping than in running. Handelsman 2018 at 813, looking at youth and young adults, and Thibault 2010 at 217, looking at Olympic performances, both found male advantages in the range of 15%-20%. See also Tønnessen 2015 (approximately 19%); Handelsman 2017 (19%); Hilton 2021 at 201 (18%). Looking at the vertical jump called for in volleyball, research on elite volleyball players found that males jumped on average 50% higher during an “attack” at the net than did females. (Sattler 2015; see also Hilton 2021 at 203 (33% higher vertical jump).)

30. Higerd (2021) in an evaluation of high school high jump performance available through the track and field database athletic.net®, which included five states (CA, FL, MN, NY, WA), over three years (2017 – 2019) (at 82) observed that in 23,390 females and 26,843 males, females jumped an average of 1.35 m and males jumped an average of 1.62 m, for an 18.18% performance advantage for males (at 96). In an evaluation of long jump performance in 45,705 high school females and 54,506 high school males the females jumped an average of 4.08 m and males jumped an average of 5.20 m, for a 24.14% performance advantage for males (at 97).

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31. The combined male advantage of body height and jump height means, for example, that a total of seven women in the WNBA have ever dunked a basketball in the regulation 10 foot hoop,⁵ while the ability to dunk appears to be almost universal among NBA players: “Since the 1996–97 season (the earliest data is available from Basketball-Reference.com), 1,801 different [NBA] players have combined for 210,842 regular-season dunks, and 1,259 out of 1,367 players (or 92%) who have played at least 1,000 minutes have dunked at least once.”⁶

D. Men throw, hit, and kick faster and farther.

32. Strength, arm-length, and speed combine to give men a large advantage over women in throwing. This has been measured in a number of studies.

33. One study of elite male and female baseball pitchers showed that men throw baseballs 35% faster than women—81 miles/hour for men vs. 60 miles/hour for women. (Chu 2009.) By age 12, “boys’ throwing velocity is already between 3.5 and 4 standard deviation units higher than the girls’.” (Thomas 1985 at 276.) By age seventeen, the *average* male can throw a ball farther than 99% of seventeen-year-old females. (Lombardo 2018; Chu 2009; Thomas 1985 at 268.) Looking at publicly available data, Hilton & Lundberg found that in both baseball pitching and the field hockey “drag flick,” the *record* ball speeds achieved by males are more than 50% higher than those achieved by females. (Hilton 2021 at 202-203.)

34. Men achieve serve speeds in tennis more than 15% faster than women; and likewise in golf achieve ball speeds off the tee more than 15% faster than women. (Hilton 2021 at 202.)

35. Males are able to throw a javelin more than 30% farther than females. (Lombardo 2018 Table 2; Hilton 2021 at 203.)

36. Men serve and spike volleyballs with higher velocity than women, with a performance advantage in the range of 29-34%. (Hilton 2021 at 204 Fig. 1.)

37. Men are also able to kick balls harder and faster. A study comparing collegiate soccer players found that males kick the ball with an average 20% greater velocity than females. (Sakamoto 2014.)

⁵ https://www.espn.com/wnba/story/_/id/32258450/2021-wnba-playoffs-brittney-griner-owns-wnba-dunking-record-coming-more.

⁶ <https://www.si.com/nba/2021/02/22/nba-non-dunkers-patty-mills-tj-mcconnell-steve-novak-daily-cover>

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E. Males exhibit faster reaction times.

38. Interestingly, men enjoy an additional advantage over women in reaction time—an attribute not obviously related to strength or metabolism (e.g. VO_2max). “Reaction time in sports is crucial in both simple situations such as the gun shot in sprinting and complex situations when a choice is required. In many team sports this is the foundation for tactical advantages which may eventually determine the outcome of a game.” (Dogan 2009 at 92.) “Reaction times can be an important determinant of success in the 100m sprint, where medals are often decided by hundredths or even thousandths of a second.” (Tønnessen 2013 at 885.)

39. The existence of a sex-linked difference in reaction times is consistent over a wide range of ages and athletic abilities. (Dykiert 2012.) Even by the age of 4 or 5, in a ruler-drop test, males have been shown to exhibit 4% to 6% faster reaction times than females. (Latorre-Roman 2018.) In high school athletes taking a common baseline “ImPACT” test, males showed 3% faster reaction times than females. (Mormile 2018.) Researchers have found a 6% male advantage in reaction times of both first-year medical students (Jain 2015) and world-class sprinters (Tønnessen 2013).

40. Most studies of reaction times use computerized tests which ask participants to hit a button on a keyboard or to say something in response to a stimulus. One study on NCAA athletes measured “reaction time” by a criterion perhaps more closely related to athletic performance—that is, how fast athletes covered 3.3 meters after a starting signal. Males covered the 3.3 meters 10% faster than females in response to a visual stimulus, and 16% faster than females in response to an auditory stimulus. (Spierer 2010.)

41. Researchers have speculated that sex-linked differences in brain structure, as well as estrogen receptors in the brain, may be the source of the observed male advantage in reaction times, but at present this remains a matter of speculation and hypothesis. (Mormile at 19; Spierer at 962.)

III. Men have large measured physiological differences compared to women which demonstrably or likely explain their performance advantages.

42. No single physiological characteristic alone accounts for all or any one of the measured advantages that men enjoy in athletic performance. However, scientists have identified and measured a number of physiological factors that contribute to superior male performance.

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A. Men are taller and heavier than women

43. In some sports, such as basketball and volleyball, height itself provides competitive advantage. While some women are taller than some men, based on data from 20 countries in North America, Europe, East Asia, and Australia, the 50th percentile for body height for women is 164.7 cm (5 ft 5 inches) and the 50th percentile for body height for men is 178.4 cm (5 ft 10 inches). Helping to illustrate the inherent height difference between men and women, from the same data analysis, the 95th percentile for body height for women is 178.9 cm (5 feet 10.43 inches), which is only 0.5 cm taller than the 50th percentile for men (178.4 cm; 5 feet 10.24 inches), while the 95th percentile for body height for men is 193.6 cm (6 feet 4.22 inches). (Roser 2013.)

44. To look at a specific athletic population, an evaluation of NCAA Division 1 basketball players compared 68 male guards and 59 male forwards to 105 female guards and 91 female forwards, and found that on average the male guards were 187.4 ± 7.0 cm tall and weighed 85.2 ± 7.4 kg while the female guards were 171.6 ± 5.0 cm tall and weighed 68.0 ± 7.4 kg. The male forwards were 201.7 ± 4.0 cm tall and weighed 105.3 ± 5.9 kg while the female forwards were 183.5 ± 4.4 cm tall and weighed 82.2 ± 12.5 kg. (Fields 2018 at 3.)

B. Males have larger and longer bones, stronger bones, and different bone configuration.

45. Obviously, males on average have longer bones. “Sex differences in height have been the most thoroughly investigated measure of bone size, as adult height is a stable, easily quantified measure in large population samples. Extensive twin studies show that adult height is highly heritable with predominantly additive genetic effects that diverge in a sex-specific manner from the age of puberty onwards.” (Handelsman 2018 at 818.) “Pubertal testosterone exposure leads to an ultimate average greater height in men of 12–15 centimeters, larger bones, greater muscle mass, increased strength and higher hemoglobin levels.” (Gooren 2011 at 653.)

46. “Men have distinctively greater bone size, strength, and density than do women of the same age. As with muscle, sex differences in bone are absent prior to puberty but then accrue progressively from the onset of male puberty due to the sex difference in exposure to adult male circulating testosterone concentrations.” (Handelsman 2018 at 818.)

47. “[O]n average men are 7% to 8% taller with longer, denser, and stronger bones, whereas women have shorter humerus and femur cross-sectional

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areas being 65% to 75% and 85%, respectively, those of men.” (Handelsman 2018 at 818.)

48. Greater height, leg, and arm length themselves provide obvious advantages in several sports. But male bone geometry also provides less obvious advantages. “The major effects of men’s larger and stronger bones would be manifest via their taller stature as well as the larger fulcrum with greater leverage for muscular limb power exerted in jumping, throwing, or other explosive power activities.” (Handelsman 2018 at 818.)

49. Male advantage in bone size is not limited to length, as larger bones provide the mechanical framework for larger muscle mass. “From puberty onwards, men have, on average, 10% more bone providing more surface area. The larger surface area of bone accommodates more skeletal muscle so, for example, men have broader shoulders allowing more muscle to build. This translates into 44% less upper body strength for women, providing men an advantage for sports like boxing, weightlifting and skiing. In similar fashion, muscle mass differences lead to decreased trunk and lower body strength by 64% and 72%, respectively in women. These differences in body strength can have a significant impact on athletic performance, and largely underwrite the significant differences in world record times and distances set by men and women.” (Knox 2019 at 397.)

50. Meanwhile, distinctive aspects of the female pelvis geometry cut against athletic performance. “[T]he widening of the female pelvis during puberty, balancing the evolutionary demands of obstetrics and locomotion, retards the improvement in female physical performance.” (Handelsman 2018 at 818.) “[T]he major female hormones, oestrogens, can have effects that disadvantage female athletic performance. For example, women have a wider pelvis changing the hip structure significantly between the sexes. Pelvis shape is established during puberty and is driven by oestrogen. The different angles resulting from the female pelvis leads to decreased joint rotation and muscle recruitment ultimately making them slower.” (Knox 2019 at 397.)

51. There are even sex-based differences in foot size and shape. Wunderlich & Cavanaugh (2001) observed that a “foot length of 257 mm represents a value that is ... approximately the 20th percentile men’s foot lengths and the 80th percentile women’s foot lengths.” (607) and “For a man and a woman, both with statures of 170 cm (5 feet 7 inches), the man would have a foot that was approximately 5 mm longer and 2 mm wider than the woman.” (608). Based on these, and other analyses, they conclude that “female feet and legs are not simply scaled-down versions of male feet but rather differ in a number of shape characteristics, particularly at the arch, the lateral side of the foot, the first toe, and the ball of the foot.” (605) Further, Fessler et al. (2005) observed that “female foot length is consistently smaller than male foot length” (44) and concludes that

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“proportionate foot length is smaller in women” (51) with an overall conclusion that “Our analyses of genetically disparate populations reveal a clear pattern of sexual dimorphism, with women consistently having smaller feet proportionate to stature than men.” (53)

52. Beyond simple performance, the greater density and strength of male bones provide higher protection against stresses associated with extreme physical effort: “[S]tress fractures in athletes, mostly involving the legs, are more frequent in females, with the male protection attributable to their larger and thicker bones.” (Handelsman 2018 at 818.)

C. Males have much larger muscle mass.

53. The fact that, on average, men have substantially larger muscles than women is as well known to common observation as men’s greater height. But the male advantage in muscle size has also been extensively measured. The differential is large.

54. “On average, women have 50% to 60% of men’s upper arm muscle cross-sectional area and 65% to 70% of men’s thigh muscle cross-sectional area, and women have 50% to 60% of men’s upper limb strength and 60% to 80% of men’s leg strength. Young men have on average a skeletal muscle mass of >12 kg greater than age-matched women at any given body weight.” (Handelsman 2018 at 812. See also Gooren 2011 at 653, Thibault 2010 at 214.)

55. “There is convincing evidence that the sex differences in muscle mass and strength are sufficient to account for the increased strength and aerobic performance of men compared with women and is in keeping with the differences in world records between the sexes.” (Handelsman 2018 at 816.)

56. Once again, looking at specific and comparable populations of athletes, an evaluation of NCAA Division 1 basketball players consisting of 68 male guards and 59 male forwards, compared to 105 female guards and 91 female forwards, reported that on average the male guards had 77.7 ± 6.4 kg of fat free mass and 7.4 ± 3.1 kg fat mass while the female guards had 54.6 ± 4.4 kg fat free mass and 13.4 ± 5.4 kg fat mass. The male forwards had 89.5 ± 5.9 kg fat free mass and 15.9 ± 5.6 kg fat mass while the female forwards had 61.8 ± 5.9 kg fat free mass and 20.5 ± 7.7 kg fat mass. (Fields 2018 at 3.)

D. Females have a larger proportion of body fat.

57. While women have smaller muscles, they have proportionately more body fat, in general a negative for athletic performance. “Oestrogens also affect body

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composition by influencing fat deposition. Women, on average, have higher percentage body fat, and this holds true even for highly trained healthy athletes (men 5%–10%, women 8%–15%). Fat is needed in women for normal reproduction and fertility, but it is not performance-enhancing. This means men with higher muscle mass and less body fat will normally be stronger kilogram for kilogram than women.” (Knox 2019 at 397.)

58. “[E]lite females have more (<13 vs. <5 %) body fat than males. Indeed, much of the difference in [maximal oxygen uptake] between males and females disappears when it is expressed relative to lean body mass. . . . Males possess on average 7–9 % less percent body fat than females.” (Lepers 2013 at 853.)

59. Knox et al. observe that both female pelvis shape and female body fat levels “disadvantage female athletes in sports in which speed, strength and recovery are important,” (Knox 2019 at 397), while Tønnessen et al. describe the “ratio between muscular power and total body mass” as “critical” for athletic performance. (Tønnessen 2015 at 7.)

E. Males are able to metabolize and release energy to muscles at a higher rate due to larger heart and lung size, and higher hemoglobin concentrations.

60. While advantages in bone size, muscle size, and body fat are easily perceived and understood by laymen, scientists also measure and explain the male athletic advantage at a more abstract level through measurements of metabolism, or the ability to deliver energy to muscles throughout the body.

61. Energy release at the muscles depends centrally on the body’s ability to deliver oxygen to the muscles, where it is essential to the complex chain of biochemical reactions that make energy available to power muscle fibers. Men have multiple distinctive physiological attributes that together give them a large advantage in oxygen delivery.

62. Oxygen is taken into the blood in the lungs. Men have greater capability to take in oxygen for multiple reasons. “[L]ung capacity [is] larger in men because of a lower diaphragm placement due to Y-chromosome genetic determinants.” (Knox 2019 at 397.) Supporting larger lung capacity, men have “greater cross-sectional area of the trachea”; that is, they can simply move more air in and out of their lungs in a given time. (Hilton 2021 at 201.)

63. More, male lungs provide superior oxygen exchange even for a given volume: “The greater lung volume is complemented by testosterone-driven **enhanced alveolar multiplication** rate during the early years of life. Oxygen exchange takes place between the air we breathe and the bloodstream at the alveoli,

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so more alveoli allows more oxygen to pass into the bloodstream. Therefore, the greater lung capacity allows more air to be inhaled with each breath. This is coupled with an improved uptake system allowing men to absorb more oxygen.” (Knox 2019 at 397.)

64. “Once in the blood, oxygen is carried by haemoglobin. **Haemoglobin concentrations** are directly modulated by testosterone so men have higher levels and can carry more oxygen than women.” (Knox 2019 at 397.) “It is well known that levels of circulating hemoglobin are androgen-dependent and consequently higher in men than in women by 12% on average.... Increasing the amount of hemoglobin in the blood has the biological effect of increasing oxygen transport from lungs to tissues, where the increased availability of oxygen enhances aerobic energy expenditure.” (Handelsman 2018 at 816.) (See also Lepers 2013 at 853; Handelsman 2017 at 71.) “It may be estimated that as a result the average maximal oxygen transfer will be ~10% greater in men than in women, which has a direct impact on their respective athletic capacities.” (Handelsman 2018 at 816.)

65. But the male metabolic advantage is further multiplied by the fact that men are also able to **circulate more blood per second** than are women. “Oxygenated blood is pumped to the active skeletal muscle by the heart. The left ventricle chamber of the heart is the reservoir from which blood is pumped to the body. The larger the left ventricle, the more blood it can hold, and therefore, the more blood can be pumped to the body with each heartbeat, a physiological parameter called ‘stroke volume’. The female heart size is, on average, 85% that of a male resulting in the stroke volume of women being around 33% less.” (Knox 2018 at 397.) Hilton cites different studies that make the same finding, reporting that men on average can pump 30% more blood through their circulatory system per minute (“cardiac output”) than can women. (Hilton 2021 at 202.)

66. Finally, at the cell where the energy release is needed, men appear to have yet another advantage. “Additionally, there is experimental evidence that testosterone increases . . . **mitochondrial biogenesis**, myoglobin expression, and IGF-1 content, which may augment energetic and power generation of skeletal muscular activity.” (Handelsman 2018 at 811.)

67. “Putting all of this together, men have a much more efficient cardiovascular and respiratory system.” (Knox 2019 at 397.) A widely accepted measurement that reflects the combined effects of all these respiratory, cardiovascular, and metabolic advantages is referred to as “ $\dot{V}O_{2\max}$,” which refers to the maximum rate at which an individual can consume oxygen during aerobic

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exercise.⁷ Looking at 11 separate studies, including both trained and untrained individuals, Pate et al. concluded that men have a 50% higher VO_2max than women on average, and a 25% higher VO_2max in relation to body weight. (Pate 1984 at 92. See also Hilton 2021 at 202.)

IV. The role of testosterone in the development of male advantages in athletic performance.

68. The following tables of reference ranges for circulating testosterone in males and females are presented to help provide context for some of the subsequent information regarding athletic performance and physical fitness in children, youth, and adults, and regarding testosterone suppression in transwomen and athletic regulations. These data were obtained from the Mayo Clinic Laboratories (available at <https://www.mayocliniclabs.com/test-catalog/overview/83686#Clinical-and-Interpretive>, accessed January 14, 2022).

Reference ranges for serum testosterone concentrations in males and females.

Age	Males	Females
0 – 5 months	2.6 – 13.9 nmol/l	0.7 – 2.8 nmol/l
6 months – 9 years	0.2 – 0.7 nmol/l	0.2 – 0.7 nmol/l
10 – 11 years	0.2 – 4.5 nmol/l	0.2 – 1.5 nmol/l
12 -13 years	0.2 – 27.7 nmol/l	0.2 – 2.6 nmol/l
14 years	0.2 – 41.6 nmol/l	0.2 – 2.6 nmol/l
15 – 16 years	3.5 – 41.6 nmol/l	0.2 – 2.6 nmol/l
17 – 18 years	10.4 – 41.6 nmol/l	0.7 – 2.6 nmol/l
19 years and older	8.3 – 32.9 nmol/l	0.3 – 2.1 nmol/l

Please note that testosterone concentrations are sometimes expressed in units of ng/dl, and 1 nmol/l = 28.85 ng/dl.

69. Tanner Stages can be used to help evaluate the onset and progression of puberty and may be more helpful in evaluating normal testosterone concentrations than age in adolescents. “Puberty onset (transition from Tanner stage I to Tanner stage II) occurs for boys at a median age of 11.5 years and for girls

⁷ VO_2max is “based on hemoglobin concentration, total blood volume, maximal stroke volume, cardiac size/mass/compliance, skeletal muscle blood flow, capillary density, and mitochondrial content.” International Statement, *The Role of Testosterone in Athletic Performance* (January 2019), available at https://law.duke.edu/sites/default/files/centers/sportslaw/Experts_T_Statement_2019.pdf.

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at a median age of 10.5 years. . . . Progression through Tanner stages is variable. Tanner stage V (young adult) should be reached by age 18.”

(<https://www.mayocliniclabs.com/test-catalog/overview/83686#Clinical-and-Interpretive>, accessed January 14, 2022).

Reference Ranges for serum testosterone concentrations by Tanner stage

Tanner Stage	Males	Females
I (prepubertal)	0.2 – 0.7 nmol/l	0.7 – 0.7 nmol/l
II	0.3 – 2.3 nmol/l	0.2 – 1.6 nmol/l
III	0.9 – 27.7 nmol/l	0.6 – 2.6 nmol/l
IV	2.9 – 41.6 nmol/l	0.7 – 2.6 nmol/l
V (young adult)	10.4 – 32.9 nmol/l	0.4 – 2.1 nmol/l

70. Senefeld et al. (2020 at 99) state that “Data on testosterone levels in children and adolescents segregated by sex are scarce and based on convenience samples or assays with limited sensitivity and accuracy.” They therefore “analyzed the timing of the onset and magnitude of the divergence in testosterone in youths aged 6 to 20 years by sex using a highly accurate assay” (isotope dilution liquid chromatography tandem mass spectrometry). Senefeld observed a significant difference beginning at age 11, which is to say about fifth grade.

Serum testosterone concentrations (nmol/L) in youths aged 6 to 20 years measured using isotope dilution liquid chromatography tandem mass spectrometry (Senefeld et al. ,2020, at 99)

Age (y)	Boys			Girls		
	5th	50th	95th	5th	50th	95th
6	0.0	0.1	0.2	0.0	0.1	0.2
7	0.0	0.1	0.2	0.0	0.1	0.3
8	0.0	0.1	0.3	0.0	0.1	0.3
9	0.0	0.1	0.3	0.1	0.2	0.6
10	0.1	0.2	2.6	0.1	0.3	0.9
11	0.1	0.5	11.3	0.2	0.5	1.3
12	0.3	3.6	17.2	0.2	0.7	1.4
13	0.6	9.2	21.5	0.3	0.8	1.5
14	2.2	11.9	24.2	0.3	0.8	1.6
15	4.9	13.2	25.8	0.4	0.8	1.8
16	5.2	14.9	24.1	0.4	0.9	2.0
17	7.6	15.4	27.0	0.5	1.0	2.0
18	9.2	16.3	25.5	0.4	0.9	2.1
19	8.1	17.2	27.9	0.4	0.9	2.3
20	6.5	17.9	29.9	0.4	1.0	3.4

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A. Boys exhibit advantages in athletic performance even before puberty.

71. It is often said or assumed that boys enjoy no significant athletic advantage over girls before puberty. However, this is not true. Writing in their seminal work on the physiology of elite young female athletes, McManus and Armstrong (2011) reviewed the differences between boys and girls regarding bone density, body composition, cardiovascular function, metabolic function, and other physiologic factors that can influence athletic performance. They stated, “At birth, boys tend to have a greater lean mass than girls. This difference remains small but detectable throughout childhood with about a 10% greater lean mass in boys than girls prior to puberty.” (28) “Sexual dimorphism underlies much of the physiologic response to exercise,” and most importantly these authors concluded that, “Young girl athletes are not simply smaller, less muscular boys.” (23)

72. Certainly, boys’ physiological and performance advantages increase rapidly from the beginning of puberty until around age 17-19. But much data and multiple studies show that significant physiological differences, and significant male athletic performance advantages in certain areas, exist before significant developmental changes associated with male puberty have occurred.

73. Starting at birth, girls have more body fat and less fat-free mass than boys. Davis et al. (2019) in an evaluation of 602 infants reported that at birth and age 5 months, infant boys have larger total body mass, body length, and fat-free mass while having lower percent body fat than infant girls. In an evaluation of 20 boys and 20 girls ages 3-8 years old, matched for age, height, and body weight Taylor et al. (Taylor 1997) reported that the “boys had significantly less fat, a lower % body fat and a higher bone-free lean tissue mass than the girls” when “expressed as a percentage of the average fat mass of the boys”, the girls’ fat mass was 52% higher than the boys “...while the bone-free lean tissue mass was 9% lower” (at 1083.) In an evaluation of 376 prepubertal [Tanner Stage 1] boys and girls, Taylor et al. (2010) observed that the boys had 21.6% more lean mass, and 13% less body fat (when expressed as percent of total body mass) than did the girls. In a review of 22 peer reviewed publications on the topic, Staiano and Katzmarzyk (2012) conclude that “... girls have more T[otal]B[ody]F[at] than boys throughout childhood and adolescence. (at 4.)

74. In the seminal textbook, *Growth, Maturation, and Physical Activity*, Malina et al. (2004) present a summary of data from Gauthier et al. (1983) which present data from “a national sample of Canadian children and youth” demonstrating that from ages 7 to 17, boys have a higher aerobic power output than do girls of the same ages when exercise intensity is measured using heart rate

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(Malina at 242.) That is to say, that at a heart rate of 130 beats per minute, or 150, or 170, a 7 to 17 year old boy should be able to run, bike, or swim faster than a similarly aged girl.

75. Considerable data from school-based fitness testing exists showing that prepubertal boys outperform comparably aged girls in tests of muscular strength, muscular endurance, and running speed. These sex-based differences in physical fitness are relevant to the current issue of sex-based sports categories because, as stated by Lesinski et al. (2020), in an evaluation “of 703 male and female elite young athletes aged 8–18” (1) “fitness development precedes sports specialization” (2) and further observed that “males outperformed females in C[ounter]M[ovement]J[ump], D[rop]J[ump], C[hange]o[f]D[irection] speed] performances and hand grip strength.” (5).

76. Tambalis et al. (2016) states that “based on a large data set comprising 424,328 test performances” (736) using standing long jump to measure lower body explosive power, sit and reach to measure flexibility, timed 30 second sit ups to measure abdominal and hip flexor muscle endurance, 10 x 5 meter shuttle run to evaluate speed and agility, and multi-stage 20 meter shuttle run test to estimate aerobic performance (738). “For each of the fitness tests, performance was better in boys compared with girls ($p < 0.001$), except for the S[it and] R[each] test ($p < 0.001$).” (739) In order to illustrate that the findings of Tambalis (2016) are not unique to children in Greece, the authors state “Our findings are in accordance with recent studies from Latvia [] Portugal [] and Australia [Catley & Tomkinson (2013)].”(744).

77. The 20-m multistage fitness test is a commonly used maximal running aerobic fitness test used in the Eurofit Physical Fitness Test Battery and the FitnessGram Physical Fitness test. It is also known as the 20-meter shuttle run test, PACER test, or beep test (among other names; this is not the same test as the shuttle run in the Presidential Fitness Test). This test involves continuous running between two lines 20 meters apart in time to recorded beeps. The participants stand behind one of the lines facing the second line and begin running when instructed by the recording. The speed at the start is quite slow. The subject continues running between the two lines, turning when signaled by the recorded beeps. After about one minute, a sound indicates an increase in speed, and the beeps will be closer together. This continues each minute (level). If the line is reached before the beep sounds, the subject must wait until the beep sounds before continuing. If the line is not reached before the beep sounds, the subject is given a warning and must continue to run to the line, then turn and try to catch up with the pace within two more 'beeps'. The subject is given a warning the first time they fail to reach the line (within 2 meters) and eliminated after the second warning.

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78. To illustrate the sex-based performance differences observed by Tambalis, I have prepared the following table showing the number of laps completed in the 20 m shuttle run for children ages 6-18 years for the low, middle, and top decile (Tambalis 2016 at 740 & 742), and have calculated the percent difference between the boys and girls using the same equation as Millard-Stafford (2018).

Performance difference between boys and girls ÷ Girls performance

Number of laps completed in the 20m shuttle run for children ages 6-18 years

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
6	4	14	31	4.0	12.0	26.0	0.0%	16.7%	19.2%
7	8	18	38	8.0	15.0	29.0	0.0%	20.0%	31.0%
8	9	23	47	9.0	18.0	34.0	0.0%	27.8%	38.2%
9	11	28	53	10.0	20.0	40.0	10.0%	40.0%	32.5%
10	12	31	58	11.0	23.0	43.0	9.1%	34.8%	34.9%
11	15	36	64	12.0	26.0	48.0	25.0%	38.5%	33.3%
12	15	39	69	12.0	26.0	49.0	25.0%	50.0%	40.8%
13	16	44	76	12.0	26.0	50.0	33.3%	69.2%	52.0%
14	19	50	85	12.0	26.0	50.0	58.3%	92.3%	70.0%
15	20	53	90	12.0	25.0	47.0	66.7%	112.0%	91.5%
16	20	54	90	11.0	24.0	45.0	81.8%	125.0%	100.0%
17	18	50	86	10.0	23.0	50.0	80.0%	117.4%	72.0%
18	13	48	87	8.0	23.0	39.5	62.5%	108.7%	120.3%

79. The Presidential Fitness Test was widely used in schools in the United States from the late 1950s until 2013 (when it was phased out in favor of the Presidential Youth Fitness Program and FitnessGram, both of which focus on health-related physical fitness and do not present data in percentiles). Students participating in the Presidential Fitness Test could receive “The National Physical Fitness Award” for performance equal to the 50th percentile in five areas of the fitness test, “while performance equal to the 85th percentile could receive the Presidential Physical Fitness Award.” Tables presenting the 50th and 85th percentiles for the Presidential Fitness Test for males and females ages 6 – 17, and differences in performance between males and females, for curl-ups, shuttle run, 1 mile run, push-ups, and pull-ups appear in the Appendix.

80. For both the 50th percentile (The National Physical Fitness Award) and the 85th percentile (Presidential Physical Fitness Award), with the exception of curl-ups in 6-year-old children, boys outperform girls. The difference in pull-ups for the 85th percentile for ages 7 through 17 are particularly informative with boys

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outperforming girls by 100% – 1200%, highlighting the advantages in upper body strength in males.

81. A very recent literature review commissioned by the five United Kingdom governmental Sport Councils concluded that while “[i]t is often assumed that children have similar physical capacity regardless of their sex, . . . large-scale data reports on children from the age of six show that young males have significant advantage in cardiovascular endurance, muscular strength, muscular endurance, speed/agility and power tests,” although they “score lower on flexibility tests.” (UK Sports Councils’ Literature Review 2021 at 3.)

82. Hilton et al., also writing in 2021, reached the same conclusion: “An extensive review of fitness data from over 85,000 Australian children aged 9–17 years old showed that, compared with 9-year-old females, 9-year-old males were faster over short sprints (9.8%) and 1 mile (16.6%), could jump 9.5% further from a standing start (a test of explosive power), could complete 33% more push-ups in 30 [seconds] and had 13.8% stronger grip.” (Hilton 2021 at 201, summarizing the findings of Catley & Tomkinson 2013.)

83. The following data are taken from Catley & Tomkinson (2013 at 101) showing the low, middle, and top decile for 1.6 km run (1.0 mile) run time for 11,423 girls and boys ages 9-17.

1.6 km run (1.0 mile) run time for 11,423 girls and boys ages 9-17

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
9	684	522	423	769.0	609.0	499.0	11.1%	14.3%	15.2%
10	666	511	420	759.0	600.0	494.0	12.3%	14.8%	15.0%
11	646	500	416	741.0	586.0	483.0	12.8%	14.7%	13.9%
12	621	485	408	726.0	575.0	474.0	14.5%	15.7%	13.9%
13	587	465	395	716.0	569.0	469.0	18.0%	18.3%	15.8%
14	556	446	382	711.0	567.0	468.0	21.8%	21.3%	18.4%
15	531	432	373	710.0	570.0	469.0	25.2%	24.2%	20.5%
16	514	423	366	710.0	573.0	471.0	27.6%	26.2%	22.3%
17	500	417	362	708.0	575.0	471.0	29.4%	27.5%	23.1%

84. Tomkinson et al. (2018) performed a similarly extensive analysis of literally millions of measurements of a variety of strength and agility metrics from the “Eurofit” test battery on children from 30 European countries. They provide detailed results for each metric, broken out by decile. Sampling the low, middle, and top decile, 9-year-old boys performed better than 9-year-old girls by between 6.5%

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and 9.7% in the standing broad jump; from 11.4% to 16.1% better in handgrip; and from 45.5% to 49.7% better in the “bent-arm hang.” (Tomkinson 2018.)

85. The Bent Arm Hang test is a measure of upper body muscular strength and endurance used in the Eurofit Physical Fitness Test Battery. To perform the Bent Arm Hang, the child is assisted into position with the body lifted to a height so that the chin is level with the horizontal bar (like a pull up bar). The bar is grasped with the palms facing away from body and the hands shoulder width apart. The timing starts when the child is released. The child then attempts to hold this position for as long as possible. Timing stops when the child's chin falls below the level of the bar, or the head is tilted backward to enable the chin to stay level with the bar.

86. Using data from Tomkinson (2018; table 7 at 1452), the following table sampling the low, middle, and top decile for bent arm hang for 9- to 17-year-old children can be constructed:

Bent Arm Hang time (in seconds) for children ages 9 - 17 years

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
9	2.13	7.48	25.36	1.43	5.14	16.94	48.95%	45.53%	49.70%
10	2.25	7.92	26.62	1.42	5.15	17.06	58.45%	53.79%	56.04%
11	2.35	8.32	27.73	1.42	5.16	17.18	65.49%	61.24%	61.41%
12	2.48	8.79	28.99	1.41	5.17	17.22	75.89%	70.02%	68.35%
13	2.77	9.81	31.57	1.41	5.18	17.33	96.45%	89.38%	82.17%
14	3.67	12.70	38.39	1.40	5.23	17.83	162.14%	142.83%	115.31%
15	5.40	17.43	47.44	1.38	5.35	18.80	291.30%	225.79%	152.34%
16	7.39	21.75	53.13	1.38	5.63	20.57	435.51%	286.32%	158.29%
17	9.03	24.46	54.66	1.43	6.16	23.61	531.47%	297.08%	131.51%

87. Evaluating these data, a 9-year-old boy in the 50th percentile (that is to say a 9-year-old boy of average upper body muscular strength and endurance) will perform better in the bent arm hang test than 9 through 17-year-old girls in the 50th percentile. Similarly, a 9-year-old boy in the 90th percentile will perform better in the bent arm hang test than 9 through 17-year-old girls in the 90th percentile.

88. Using data from Tomkinson et al. (2017; table 1 at 1549), the following table sampling the low, middle, and top decile for running speed in the last stage of the 20 m shuttle run for 9- to 17-year-old children can be constructed.

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20 m shuttle Running speed (km/h at the last completed stage)

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
9	8.94	10.03	11.13	8.82	9.72	10.61	1.36%	3.19%	4.90%
10	8.95	10.13	11.31	8.76	9.75	10.74	2.17%	3.90%	5.31%
11	8.97	10.25	11.53	8.72	9.78	10.85	2.87%	4.81%	6.27%
12	9.05	10.47	11.89	8.69	9.83	10.95	4.14%	6.51%	8.58%
13	9.18	10.73	12.29	8.69	9.86	11.03	5.64%	8.82%	11.42%
14	9.32	10.96	12.61	8.70	9.89	11.07	7.13%	10.82%	13.91%
15	9.42	11.13	12.84	8.70	9.91	11.11	8.28%	12.31%	15.57%
16	9.51	11.27	13.03	8.71	9.93	11.14	9.18%	13.49%	16.97%
17	9.60	11.41	13.23	8.72	9.96	11.09	10.09%	14.56%	19.30%

89. Evaluating these data, a 9-year-old boy in the 50th percentile (that is to say a 9-year-old boy of average running speed) will run faster in the final stage of the 20 m shuttle run than 9 through 17-year-old girls in the 50th percentile. Similarly, a 9-year-old boy in the 90th percentile will run faster in the final stage of the 20-m shuttle run than 9 through 15, and 17-year-old girls in the 90th percentile and will be 0.01 km/h (0.01%) slower than 16-year-old girls in the 90th percentile.

90. Just using these two examples for bent arm hang and 20-m shuttle running speed (Tomkinson 2107, Tomkinson 2018) based on large sample sizes (thus having tremendous statistical power) it becomes apparent that a 9-year-old boy will be very likely to outperform similarly trained girls of his own age and older in athletic events involving upper body muscle strength and/or running speed.

91. Another report published in 2014 analyzed physical fitness measurements of 10,302 children aged 6 -10.9 years of age, from the European countries of Sweden, Germany, Hungary, Italy, Cyprus, Spain, Belgium, and Estonia. (De Miguel-Etayo et al. 2014.) The authors observed "... that boys performed better than girls in speed, lower- and upper-limb strength and cardiorespiratory fitness." (57) The data showed that for children of comparable fitness (i.e. 99th percentile boys vs. 99th percentile girls, 50th percentile boys vs. 50th percentile girls, etc.) the boys outperform the girls at every age in measurements of handgrip strength, standing long jump, 20-m shuttle run, and predicted VO₂max (pages 63 and 64, respectively). For clarification, VO₂max is the maximal oxygen consumption, which correlates to 30-40% of success in endurance sports.

92. The standing long jump, also called the Broad Jump, is a common and easy to administer test of explosive leg power used in the Eurofit Physical Fitness Test Battery and in the NFL Combine. In the standing long jump, the participant stands behind a line marked on the ground with feet slightly apart. A two-foot take-

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off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The participant attempts to jump as far as possible, landing on both feet without falling backwards. The measurement is taken from takeoff line to the nearest point of contact on the landing (back of the heels) with the best of three attempts being scored.

93. Using data from De Miguel-Etayo et al. (2014, table 3 at 61), which analyzed physical fitness measurements of 10,302 children aged 6 -10.9 years of age, from the European countries of Sweden, Germany, Hungary, Italy, Cyprus, Spain, Belgium, and Estonia, the following table sampling the low, middle, and top decile for standing long jump for 6- to 9-year-old children can be constructed:

Standing Broad Jump (cm) for children ages 6-9 years

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
6-<6.5	77.3	103.0	125.3	69.1	93.8	116.7	11.9%	9.8%	7.4%
6.5-<7	82.1	108.0	130.7	73.6	98.7	121.9	11.5%	9.4%	7.2%
7-<7.5	86.8	113.1	136.2	78.2	103.5	127.0	11.0%	9.3%	7.2%
7.5-<8	91.7	118.2	141.6	82.8	108.3	132.1	10.7%	9.1%	7.2%
8-<8.5	96.5	123.3	146.9	87.5	113.1	137.1	10.3%	9.0%	7.1%
8.5-<9	101.5	128.3	152.2	92.3	118.0	142.1	10.0%	8.7%	7.1%

94. Another study of Eurofit results for over 400,000 Greek children reported similar results. “[C]ompared with 6-year-old females, 6-year-old males completed 16.6% more shuttle runs in a given time and could jump 9.7% further from a standing position.” (Hilton 2021 at 201, summarizing findings of Tambalis et al. 2016.)

95. Silverman (2011) gathered hand grip data, broken out by age and sex, from a number of studies. Looking only at the nine direct comparisons within individual studies tabulated by Silverman for children aged 7 or younger, in eight of these the boys had strength advantages of between 13 and 28 percent, with the remaining outlier recording only a 4% advantage for 7-year-old boys. (Silverman 2011 Table 1.)

96. To help illustrate the importance of one specific measure of physical fitness in athletic performance, Pocek (2021) stated that to be successful, volleyball “players should distinguish themselves, besides in skill level, in terms of above-average body height, upper and lower muscular power, speed, and agility. Vertical jump is a fundamental part of the spike, block, and serve.” (8377) Pocek further stated that “relative vertical jumping ability is of great importance in volleyball regardless of the players’ position, while absolute vertical jump values can differentiate players not only in terms of player position and performance level but in their career trajectories.” (8382)

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97. Using data from Ramírez-Vélez (2017; table 2 at 994) which analyzed vertical jump measurements of 7,614 healthy Colombian schoolchildren aged 9 -17.9 years of age the following table sampling the low, middle, and top decile for vertical jump can be constructed:

Vertical Jump Height (cm) for children ages 9 - 17 years

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
9	18.0	24.0	29.5	16.0	22.3	29.0	12.5%	7.6%	1.7%
10	19.5	25.0	32.0	18.0	24.0	29.5	8.3%	4.2%	8.5%
11	21.0	27.0	32.5	19.5	25.0	31.0	7.7%	8.0%	4.8%
12	22.0	27.5	34.5	20.0	25.5	31.5	10.0%	7.8%	9.5%
13	23.0	30.5	39.0	19.0	25.5	32.0	21.1%	19.6%	21.9%
14	23.5	32.0	41.5	20.0	25.5	32.5	17.5%	25.5%	27.7%
15	26.0	35.5	43.0	20.2	26.0	32.5	28.7%	36.5%	32.3%
16	28.0	36.5	45.1	20.5	26.5	33.0	36.6%	37.7%	36.7%
17	28.0	38.0	47.0	21.5	27.0	35.0	30.2%	40.7%	34.3%

98. Similarly, using data from Taylor (2010; table 2, at 869) which analyzed vertical jump measurements of 1,845 children aged 10 -15 years in primary and secondary schools in the East of England, the following table sampling the low, middle, and top decile for vertical jump can be constructed:

Vertical Jump Height (cm) for children 10 -15 years

Age	Male			Female			Male-Female % Difference		
	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile	10th %ile	50th %ile	90th %ile
10	16.00	21.00	29.00	15.00	22.00	27.00	6.7%	-4.5%	7.4%
11	20.00	27.00	34.00	19.00	25.00	32.00	5.3%	8.0%	6.3%
12	23.00	30.00	37.00	21.00	27.00	33.00	9.5%	11.1%	12.1%
13	23.00	32.00	40.00	21.00	26.00	34.00	9.5%	23.1%	17.6%
14	26.00	36.00	44.00	21.00	28.00	34.00	23.8%	28.6%	29.4%
15	29.00	37.00	44.00	21.00	28.00	39.00	38.1%	32.1%	12.8%

99. As can be seen from the data from Ramírez-Vélez (2017) and Taylor (2010), males consistently outperform females of the same age and percentile in vertical jump height. Both sets of data show that an 11-year-old boy in the 90th percentile for vertical jump height will outperform girls in the 90th percentile at ages 11 and 12, and will be equal to girls at ages 13, 14, and possibly 15. These data indicate that an 11-year-old would be likely to have an advantage over girls of the same age and older in sports such as volleyball where “absolute vertical jump

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values can differentiate players not only in terms of player position and performance level but in their career trajectories.” (Pocek 2021 at 8382.)

100. Boys also enjoy an advantage in throwing well before puberty. “Boys exceed girls in throwing velocity by 1.5 standard deviation units as early as 4 to 7 years of age. . . The boys exceed the girls [in throwing distance] by 1.5 standard deviation units as early as 2 to 4 years of age.” (Thomas 1985 at 266.) This means that the average 4- to 7-year-old boy can out-throw approximately 87% of all girls of his age.

101. Record data from USA Track & Field indicate that boys outperform girls in track events even in the youngest age group for whom records are kept (age 8 and under).⁸

**American Youth Outdoor Track & Field Record times in
age groups 8 and under (time in seconds)**

Event	Boys	Girls	Difference
100M	13.65	13.78	0.95%
200M	27.32	28.21	3.26%
400M	62.48	66.10	5.79%
800M	148.59	158.11	6.41%
1500M	308.52	314.72	2.01%
Mean			3.68%

102. Looking at the best times within a single year shows a similar pattern of consistent advantage for even young boys. I consider the 2018 USATF Region 8 Junior Olympic Championships for the youngest age group (8 and under).⁹

2018 USATF Region 8 Junior Olympic Championships for the 8 and under age group

Event	Boys	Girls	Difference
100M	15.11	15.64	3.51%
200M	30.79	33.58	9.06%
400M	71.12	77.32	8.72%
800M	174.28	180.48	3.56%
1500M	351.43	382.47	8.83%
Mean			6.74%

⁸<http://legacy.usatf.org/statistics/records/view.asp?division=american&location=outdoor%20track%20%26%20field&age=youth&sport=TF>

⁹ <https://www.athletic.net/TrackAndField/meet/384619/results/m/1/100m>

⁹ <https://www.athletic.net/CrossCountry/Division/List.aspx?DivID=62211>

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103. Using Athletic.net⁹, for 2021 Cross Country and Track & Field data for boys and girls in the 7-8, 9-10, and 11-12 year old age group club reports, and for 5th, 6th, and 7th grade for the whole United States I have compiled the tables for 3000 m events, and for the 100-m, 200-m, 400-m, 800-m, 1600-m, 3000-m, long jump, and high jump Track and Field data to illustrate the differences in individual athletic performance between boys and girls, all of which appear in the Appendix. The pattern of males outperforming females was consistent across events, with rare anomalies, only varying in the magnitude of difference between males and females.

104. Similarly, using Athletic.net, for 2021 Track & Field data for boys and girls in the 6th grade for the state of West Virginia, I have compiled tables, which appear in the appendix, comparing the performance of boys and girls for the 100-m, 200-m, 400-m, 800-m, 1600-m, and 3200-m running events in which the 1st place boy was consistently faster than the 1st place girl, and the average performance of the top 10 boys was consistently faster than the average performance for the top 10 girls. Based on the finishing times for the 1st place boy and girl in the 6th grade in West Virginia 1600-m race, and extrapolating the running time to a running pace, the 1st place boy would be expected to finish 273 m in front of the 1st place girl, which is 2/3 of a lap on a standard 400-m track, or almost the length of 3 football fields. In comparison, the 1st place boy would finish 66 m in front of the 2nd place boy, and the 1st place girl would finish 20 m in front of the 2nd place girl.

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Top 10 West Virginia boys and girls 6th grade outdoor track for 2021 (time in seconds)

100 m			200 m			400 m			
	Boys	Girls		Boys	Girls		Boys	Girls	
1	13.18	14.00	Difference between #1 boy and # 1 girl 5.9%	26.97	29.28	Difference between #1 boy and # 1 girl 7.9%	60.04	65.50	Difference between #1 boy and # 1 girl 8.3%
2	13.94	14.19		29.38	30.05		60.48	67.51	
3	14.07	14.47		30.09	30.34		66.26	68.60	
4	14.44	14.86		30.10	30.73		67.12	70.43	
5	14.46	14.92	Average difference boys vs girls 2.9%	30.24	31.00	Average difference boys vs girls 2.4%	68.28	71.09	Average difference boys vs girls 5.6%
6	14.53	15.04		30.38	31.04		68.36	71.38	
7	14.75	15.04		30.54	31.10		69.65	73.61	
8	14.78	15.20		30.69	31.10		69.70	73.87	
9	14.84	15.25		30.74	31.35		69.76	74.07	
10	14.94	15.28		30.99	31.64		70.63	74.21	

800 m			1600 m			3200 m			
	Boys	Girls		Boys	Girls		Boys	Girls	
1	147.2	164.5	Difference between #1 boy and # 1 girl 10.6%	305.5	357.8	Difference between #1 boy and # 1 girl 14.6%	678.4	776.6	Difference between #1 boy and # 1 girl 12.7%
2	147.9	166.1		318.1	361.6		750.0	809.8	
3	152.1	167.2		322.0	379.8		763.3	811.0	
4	153.2	170.2		336.0	385.2		766.3	843.0	
5	155.3	171.0	Average difference boys vs girls 7.5%	342.2	390.2	Average difference boys vs girls 11.5%	771.7	850.6	Average difference boys vs girls 8.1%
6	159.5	171.5		348.0	392.0		782.8	852.1	
7	159.9	174.8		356.6	393.3		794.1	858.0	
8	167.8	174.9		357.5	395.7		803.0	862.8	
9	169.2	175.9		362.4	398.1		812.1	869.9	
10	172.6	177.6		366.0	403.2		814.3	883.3	

105. As serious runners will recognize, differences of 3%, 5%, or 8% are not easily overcome. During track competition the difference between first and second place, or second and third place, or third and fourth place (and so on) is often 0.5 - 0.7%, with some contests being determined by as little as 0.01%.

106. I performed an analysis of running events (consisting of the 100-m, 200-m, 400-m, 800-m, 1500-m, 5000-m, and 10,000-m) in the Division 1, Division 2, and Division 3 NCAA Outdoor championships for the years of 2010-2019: the mean difference between 1st and 2nd place was 0.48% for men and 0.86% for women. The mean difference between 2nd and 3rd place was 0.46% for men and 0.57% for women. The mean difference between 3rd place and 4th place was 0.31% for men and 0.44% for women. The mean difference between 1st place and 8th place (the last place to earn the title of All American) was 2.65% for men and 3.77% for women. (Brown et al. Unpublished observations, to be presented at the 2022 Annual Meeting of the American College of Sports Medicine.)

107. A common response to empirical data showing pre-pubertal performance advantages in boys is the argument that the performance of boys may

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represent a social–cultural bias for boys to be more physically active, rather than representing inherent sex-based differences in pre-pubertal physical fitness. However, the younger the age at which such differences are observed, and the more egalitarian the culture within which they are observed, the less plausible this hypothesis becomes. Eiberg et al. (2005) measured body composition, VO_2max , and physical activity in 366 Danish boys and 332 Danish girls between the ages of 6 and 7 years old. Their observations indicated that VO_2max was 11% higher in boys than girls. When expressed relative to body mass the boys' VO_2max was still 8% higher than the girls. The authors stated that “...no differences in haemoglobin or sex hormones¹⁰ have been reported in this age group,” yet “... when children with the same VO_2max were compared, boys were still more active, and in boys and girls with the same P[hysical] A[ctivity] level, boys were fitter.” (728). These data indicate that in pre-pubertal children, in a very egalitarian culture regarding gender roles and gender norms, boys still have a measurable advantage in regards to aerobic fitness when known physiological and physical activity differences are accounted for.

108. And, as I have mentioned above, even by the age of 4 or 5, in a ruler-drop test, boys exhibit 4% to 6% faster reaction times than girls. (Latorre-Roman 2018.)

109. When looking at the data on testosterone concentrations previously presented, along with the data on physical fitness and athletic performance presented, boys have advantages in athletic performance and physical fitness before there are marked differences in testosterone concentrations between boys and girls.

110. For the most part, the data I review above relate to pre-pubertal children. Today, we also face the question of inclusion in female athletics of males who have undergone “puberty suppression.” The UK Sport Councils Literature Review notes that, “In the UK, so-called ‘puberty blockers’ are generally not used until Tanner maturation stage 2-3 (i.e. after puberty has progressed into early sexual maturation).” (9.) While it is outside my expertise, my understanding is that current practice with regard to administration of puberty blockers is similar in the United States. Tanner stages 2 and 3 generally encompass an age range from 10 to 14 years old, with significant differences between individuals. Like the authors of the UK Sports Council Literature Review, I am “not aware of research” directly addressing the implications for athletic capability of the use of puberty blockers. (UK Sport Councils Literature Review at 9.) As Handelsman documents, the male advantage begins to increase rapidly—along with testosterone levels—at about age 11, or “very closely aligned to the timing of the onset of male puberty.” (Handelsman 2017.) It seems likely that males who have undergone puberty suppression will

¹⁰ This term would include testosterone and estrogens.

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have physiological and performance advantages over females somewhere between those possessed by pre-pubertal boys, and those who have gone through full male puberty, with the degree of advantage in individual cases depending on that individual's development and the timing of the start of puberty blockade.

111. Tack et al. (2018) observed that in 21 transgender-identifying biological males, administration of antiandrogens for 5-31 months (commencing at 16.3 ± 1.21 years of age), resulted in nearly, but not completely, halting of normal age-related *increases* in muscle strength. Importantly, muscle strength did not decrease after administration of antiandrogens. Rather, despite antiandrogens, these individuals retained higher muscle mass, lower percent body fat, higher body mass, higher body height, and higher grip strength than comparable girls of the same age. (Supplemental tables).

112. Klaver et al. (2018 at 256) demonstrated that the use of puberty blockers did not eliminate the differences in lean body mass between biological male and female teenagers. Subsequent use of puberty blockers combined with cross-sex hormone use (in the same subjects) still did not eliminate the differences in lean body mass between biological male and female teenagers. Furthermore, by 22 years of age, the use of puberty blockers, and then puberty blockers combined with cross sex hormones, and then cross hormone therapy alone for over 8 total years of treatment still had not eliminated the difference in lean body mass between biological males and females.

113. The effects of puberty blockers on growth and development, including muscle mass, fat mass, or other factors that influence athletic performance, have been minimally researched. Indeed, Klaver et al. (2018) is the only published research that I am aware of that has evaluated the use of puberty blockers on body composition. As stated by Roberts and Carswell (2021), "No published studies have fully characterized the impact of [puberty blockers on] final adult height or current height in an actively growing TGD youth." (1680). Likewise, "[n]o published literature provides guidance on how to best predict the final adult height for TGD youth receiving GnRHa and gender-affirming hormonal treatment." (1681). Thus, the effect of prescribing puberty blockers to a male child before the onset of puberty on the physical components of athletic performance is largely unknown. There is not any scientific evidence that such treatment eliminates the pre-existing performance advantages that prepubertal males have over prepubertal females.

B. The rapid increase in testosterone across male puberty drives characteristic male physiological changes and the increasing performance advantages.

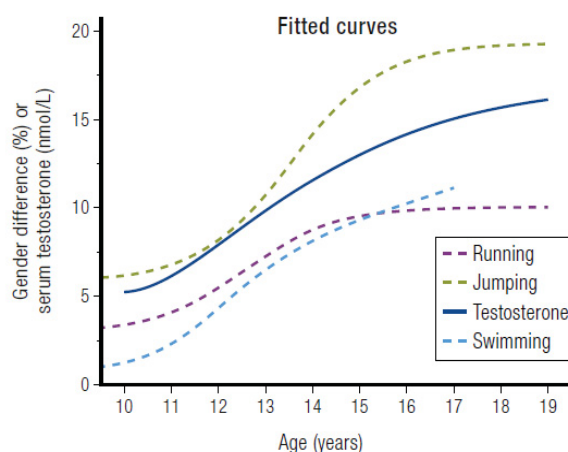
114. While boys exhibit some performance advantage even before puberty, it is both true and well known to common experience that the male advantage

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increases rapidly, and becomes much larger, as boys undergo puberty and become men. Empirically, this can be seen by contrasting the modest advantages reviewed immediately above against the large performance advantages enjoyed by men that I have detailed in Section II.

115. Multiple studies (along with common observation) document that the male performance advantage begins to increase during the early years of puberty, and then increases rapidly across the middle years of puberty (about ages 12-16). (Tønnessen 2015; Handelsman 2018 at 812-813.) Since it is well known that testosterone levels increase by more than an order of magnitude in boys across puberty, it is unsurprising that Handelsman finds that these increases in male performance advantage correlate to increasing testosterone levels, as presented in his chart reproduced below. (Handelsman 2018 at 812-13.)



116. Handelsman further finds that certain characteristic male changes including boys' increase in muscle mass do not begin at all until "circulating testosterone concentrations rise into the range of males at mid-puberty, which are higher than in women at any age." (Handelsman 2018 at 810.)

117. Knox et al. (2019) agree that "[i]t is well recognised that testosterone contributes to physiological factors including body composition, skeletal structure, and the cardiovascular and respiratory systems across the life span, with significant influence during the pubertal period. These physiological factors underpin strength, speed, and recovery with all three elements required to be competitive in almost all sports." (Knox 2019 at 397.) "High testosterone levels and prior male physiology provide an all-purpose benefit, and a substantial advantage. As the IAAF says, 'To the best of our knowledge, there is no other genetic or biological trait encountered in female athletics that confers such a huge performance advantage.'" (Knox 2019 at 399.)

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118. However, the undisputed fact that high (that is, normal male) levels of testosterone drive the characteristically male physiological changes that occur across male puberty does not at all imply that artificially *depressing* testosterone levels after those changes occur will reverse all or most of those changes so as to eliminate the male athletic advantage. This is an empirical question. As it turns out, the answer is that while some normal male characteristics can be changed by means of testosterone suppression, others cannot be, and all the reliable evidence indicates that males retain large athletic advantages even after long-term testosterone suppression.

V. The available evidence shows that suppression of testosterone in a male after puberty has occurred does not substantially eliminate the male athletic advantage.

119. The 2011 “NCAA Policy on Transgender Student-Athlete Participation” requires only that males who identify as transgender be on unspecified and unquantified “testosterone suppression treatment” for “one calendar year” prior to competing in women’s events. In supposed justification of this policy, the NCAA’s Office of Inclusion asserts that, “It is also important to know that any strength and endurance advantages a transgender woman arguably may have as a result of her prior testosterone levels dissipate after about one year of estrogen or testosterone-suppression therapy.” (NCAA 2011 at 8.)

120. Similarly, writing in 2018, Handelsman et al. could speculate that even though some male advantages established during puberty are “fixed and irreversible (bone size),” “[t]he limited available prospective evidence . . . suggests that the advantageous increases in muscle and hemoglobin due to male circulating testosterone concentrations are induced or reversed during the first 12 months.” (Handelsman 2018 at 824.)

121. But these assertions or hypotheses of the NCAA and Handelsman are now strongly contradicted by the available science. In this section, I examine what is known about whether suppression of testosterone in males can eliminate the male physiological and performance advantages over females.

A. Empirical studies find that males retain a strong performance advantage even after lengthy testosterone suppression.

122. As my review in Section II indicates, a very large body of literature documents the large performance advantage enjoyed by males across a wide range of athletics. To date, only a limited number of studies have directly measured the effect of testosterone suppression and the administration of female hormones on the athletic performance of males. These studies report that testosterone suppression for a full year (and in some cases much longer) does not come close to eliminating

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male advantage in strength (hand grip, leg strength, and arm strength) or running speed.

Hand Grip Strength

123. As I have noted, hand grip strength is a well-accepted proxy for general strength. Multiple separate studies, from separate groups, report that males retain a large advantage in hand strength even after testosterone suppression to female levels.

124. In a longitudinal study, Van Caenegem et al. reported that males who underwent standard testosterone suppression protocols lost only 7% hand strength after 12 months of treatment, and only a cumulative 9% after two years. (Van Caenegem 2015 at 42.) As I note above, on average men exhibit in the neighborhood of 60% greater hand grip strength than women, so these small decreases do not remotely eliminate that advantage. Van Caenegem et al. document that their sample of males who elected testosterone suppression began with less strength than a control male population. Nevertheless, after one year of suppression, their study population still had hand grip only 21% less than the control male population, and thus still far higher than a female population. (Van Caenegem 2015 at 42.)

125. Scharff et al. (2019) measured grip strength in a large cohort of male-to-female subjects from before the start of hormone therapy through one year of hormone therapy. The hormone therapy included suppression of testosterone to less than 2 nml/L “in the majority of the transwomen,” (1024), as well as administration of estradiol (1021). These researchers observed a small decrease in grip strength in these subjects over that time (Fig. 2), but mean grip strength of this group remained far higher than mean grip strength of females—specifically, “After 12 months, the median grip strength of transwomen [male-to-female subjects] still falls in the 95th percentile for age-matched females.” (1026).

126. Still a third longitudinal study, looking at teen males undergoing testosterone suppression, “noted no change in grip strength after hormonal treatment (average duration 11 months) of 21 transgender girls.” (Hilton 2021 at 207, summarizing Tack 2018.)

127. In a fourth study, Lapauw et al. (2008) looked at the extreme case of testosterone suppression by studying a population of 23 biologically male individuals who had undergone at least two years of testosterone suppression, followed by sex reassignment surgery that included “orchidectomy” (that is, surgical castration), and then at least an additional three years before the study date. Comparing this group against a control of age- and height-matched healthy males, the researchers found that the individuals who had gone through testosterone suppression and then surgical castration had an average hand grip (41 kg) that was

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24% weaker than the control group of healthy males. But this remains at least 25% *higher* than the average hand-grip strength of biological females as measured by Bohannon et al. (2019).

128. Summarizing these and a few other studies measuring strength loss (in most cases based on hand grip) following testosterone suppression, Harper et al. (2021) conclude that “strength loss with 12 months of [testosterone suppression] . . . ranged from non-significant to 7%. . . . [T]he small decrease in strength in transwomen after 12-36 months of [testosterone suppression] suggests that transwomen likely retain a strength advantage over cisgender women.” (Hilton 2021 at 870.)

Arm Strength

129. Lapauw et al. (2008) found that 3 years after surgical castration, preceded by at least two years of testosterone suppression, biologically male subjects had 33% less bicep strength than healthy male controls. (Lapauw (2008) at 1018.) Given that healthy men exhibit between 89% and 109% greater arm strength than healthy women, this leaves a very large residual arm strength advantage over biological women.

130. Roberts et al. have recently published an interesting longitudinal study, one arm of which considered biological males who began testosterone suppression and cross-sex hormones while serving in the United States Air Force. (Roberts 2020.) One measured performance criterion was pushups per minute, which, while not exclusively, primarily tests arm strength under repetition. *Before* treatment, the biological male study subjects who underwent testosterone suppression could do 45% more pushups per minute than the average for all Air Force women under the age of 30 (47.3 vs. 32.5). *After* between one and two years of testosterone suppression, this group could still do 33% more pushups per minute. (Table 4.) Further, the body weight of the study group did not decline at all after one to two years of testosterone suppression (in fact rose slightly) (Table 3), and was approximately 24 pounds (11.0 kg) higher than the average for Air Force women under the age of 30. (Roberts 2020 at 3.) This means that the individuals who had undergone at least one year of testosterone suppression were not only doing 1/3 more pushups per minute, but were lifting significantly more weight with each pushup.

131. After two years of testosterone suppression, the study sample in Roberts et al. was only able to do 6% more pushups per minute than the Air Force female average. But their weight remained unchanged from their pre-treatment starting point, and thus about 24 pounds higher than the Air Force female average. As Roberts et al. explain, “as a group, transwomen weigh more than CW [cis-women]. Thus, transwomen will have a higher power output than CW when

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performing an equivalent number of push-ups. Therefore, our study may underestimate the advantage in strength that transwomen have over CW.” (Roberts 2020 at 4.)

Leg Strength

132. Wiik et al. (2020), in a longitudinal study that tracked 11 males from the start of testosterone suppression through 12 months after treatment initiation, found that isometric strength levels measured at the knee “were maintained over the [study period].”¹¹ (808) “At T12 [the conclusion of the one-year study], the absolute levels of strength and muscle volume were greater in [male-to-female subjects] than in . . . CW [women who had not undergone any hormonal therapy].” (Wiik 2020 at 808.) In fact, Wiik et al. reported that “muscle strength after 12 months of testosterone suppression was comparable to baseline strength. As a result, transgender women remained about 50% stronger than . . . a reference group of females.” (Hilton 2021 at 207, summarizing Wiik 2020.)

133. Lapauw et al. (2008) found that 3 years after surgical castration, preceded by at least two years of testosterone suppression, subjects had peak knee torque only 25% lower than healthy male controls. (Lapauw 2008 at 1018.) Again, given that healthy males exhibit 54% greater maximum knee torque than healthy females, this leaves these individuals with a large average strength advantage over females even years after sex reassignment surgery.

Running speed

134. The most striking finding of the recent Roberts et al. study concerned running speed over a 1.5 mile distance—a distance that tests midrange endurance. Before suppression, the MtF study group ran 21% faster than the Air Force female average. After at least 2 year of testosterone suppression, these subjects still ran 12% faster than the Air Force female average. (Roberts 2020 Table 4.)

135. The specific experience of the well-known case of NCAA athlete Cece Telfer is consistent with the more statistically meaningful results of Roberts et al., further illustrating that male-to-female transgender treatment does not negate the inherent athletic performance advantages of a post-pubertal male. In 2016 and 2017 Cece Telfer competed as Craig Telfer on the Franklin Pierce University men’s track team, being ranked 200th and 390th (respectively) against other NCAA Division 2 men. “Craig” Telfer did not qualify for the National Championships in any events. Telfer did not compete in the 2018 season while undergoing testosterone

¹¹ Isometric strength measures muscular force production for a given amount of time at a specific joint angle but with no joint movement.

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suppression (per NCAA policy). In 2019 Cece Telfer competed on the Franklin Pierce University *women's* team, qualified for the NCAA Division 2 Track and Field National Championships, and placed 1st in the women's 400 meter hurdles and placed third in the women's 100 meter hurdles. (For examples of the media coverage of this please see <https://www.washingtontimes.com/news/2019/jun/3/cece-telfer-franklin-pierce-transgenderhurdler-wi/> last accessed May 29, 2020. <https://www.newshub.co.nz/home/sport/2019/06/athletics-transgender-woman-cece-telfer-whopreviously-competed-as-a-man-wins-ncaa-track-championship.html> (last accessed May 29, 2020).)

136. The table below shows the best collegiate performance times from the combined 2015 and 2016 seasons for Cece Telfer when competing as a man in men's events, and the best collegiate performance times from the 2019 season when competing as a woman in women's events. Comparing the times for the running events (in which male and female athletes run the same distance) there is no statistical difference between Telfer's "before and after" times. Calculating the difference in time between the male and female times, Telfer performed an average of 0.22% *faster* as a female. (Comparing the performance for the hurdle events (marked with H) is of questionable validity due to differences between men's and women's events in hurdle heights and spacing, and distance for the 110m vs. 100 m.) While this is simply one example, and does not represent a controlled experimental analysis, this information provides some evidence that male-to-female transgender treatment does not negate the inherent athletic performance advantages of a postpubertal male. (These times were obtained from https://www.tfrrs.org/athletes/6994616/Franklin_Pierce/CeCe_Telfer.html and <https://www.tfrrs.org/athletes/5108308.html>, last accessed May 29, 2020).

As Craig Telfer (male athlete)		As Cece Telfer (female athlete)	
Event	Time (seconds)	Event	Time (seconds)
55	7.01	55	7.02
60	7.67	60	7.63
100	12.17	100	12.24
200	24.03	200	24.30
400	55.77	400	54.41
55 H †	7.98	55 H †	7.91
60 H †	8.52	60 H †	8.33
110 H †	15.17	100 H †	13.41*
400 H ‡	57.34	400 H ‡	57.53**

* women's 3rd place, NCAA Division 2 National Championships

** women's 1st place, NCAA Division 2 National Championships

† men's hurdle height is 42 inches with differences in hurdle spacing between men and women

‡ men's hurdle height is 36 inches, women's height is 30 inches with the same spacing between hurdles

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137. Similarly, University of Pennsylvania swimmer Lia Thomas began competing in the women's division in the fall of 2021, after previously competing for U. Penn. in the men's division. Thomas has promptly set school, pool, and/or league women's records in 200 yard freestyle, 500 yard freestyle, and 1650 yard freestyle competitions, beating the nearest female in the 1650 yard by an unheard-of 38 seconds.

138. In a pre-peer review article, Senefeld, Coleman, Hunter, and Joyner (doi: <https://doi.org/10.1101/2021.12.28.21268483>, accessed January 12, 2022) "compared the gender-related differences in performance of a transgender swimmer who competed in both the male and female NCAA (collegiate) categories to the sex-related differences in performance of world and national class swimmers" and observed that this athlete [presumably Lia Thomas based on performance times and the timing of this article] was unranked in 2018-2019 in the 100-yard, ranked 551st in the 200-yard, 65th in the 500-yard 32nd in the 1650-yards men's freestyle. After following the NCAA protocol for testosterone suppression and competing as a woman in 2021-2022, this swimmer was ranked 94th in the 100-yard, 1st in the 200-yard, 1st in the 500-yard, and 6th in the 1650-yard women's freestyle. The performance times swimming as a female, when compared to swimming as a male, were 4.6% slower in the 100-yard, 2.6% slower in the 200-yard, 5.6% slower in the 500-yard, and 6.8% slower in the 1650-yard events than when swimming as a male. *It is important to note that these are mid-season race times and do not represent season best performance times or in a championship event where athletes often set their personal record times.* The authors concluded "...that for middle distance events (100, 200 and 400m or their imperial equivalents) lasting between about one and five minutes, the decrements in performance of the transgender woman swimmer are less than expected on the basis of a comparison of a large cohort of world and national class performances by female and male swimmers" and "it is possible that the relative improvements in this swimmer's rankings in the women's category relative to the men's category are due to legacy effects of testosterone on a number of physiological factors that can influence athletic performance."

139. Harper (2015) has often been cited as "proving" that testosterone suppression eliminates male advantage. And indeed, hedged with many disclaimers, the author in that article does more or less make that claim with respect to "distance races," while emphasizing that "the author makes no claims as to the equality of performances, pre and post gender transition, in any other sport." (Harper 2015 at 8.) However, Harper (2015) is in effect a collection of unverified anecdotes, not science. It is built around self-reported race times from just eight self-selected transgender runners, recruited "mostly" online. How and on what websites the subjects were recruited is not disclosed, nor is anything said about how those not recruited online were recruited. Thus, there is no information to tell us whether these eight runners could in any way be representative, and the

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recruitment pools and methodology, which could bear on ideological bias in their self-reports, is not disclosed.

140. Further, the self-reported race times relied on by Harper (2015) *span 29 years*. It is well known that self-reported data, particularly concerning emotionally or ideologically fraught topics, is unreliable, and likewise that memory of distant events is unreliable. Whether the subjects were responding from memory or from written records, and if so what records, is not disclosed, and does not appear to be known to the author. For six of the subjects, the author claims to have been able to verify “approximately half” of the self-reported times. Which scores these are is not disclosed. The other two subjects responded only anonymously, so nothing about their claims could be or was verified. In short, neither the author nor the reader knows whether the supposed “facts” on which the paper’s analysis is based are true.

141. Even if we could accept them at face value, the data are largely meaningless. Only two of the eight study subjects reported (undefined) “stable training patterns,” and even with consistent training, athletic performance generally declines with age. As a result, when the few data points span 29 years, it is not possible to attribute declines in performance to asserted testosterone suppression. Further, distance running is usually not on a track, and race times vary significantly depending on the course and the weather. Only one reporting subject who claimed a “stable training pattern” reported “before and after” times on the same course within three years’ time,” which the author acknowledges would “represent the best comparison points.”

142. Harper (2015) to some extent acknowledges its profound methodological flaws, but seeks to excuse them by the difficulty of breaking new ground. The author states that, “The first problem is how to formulate a study to create a meaningful measurement of athletic performance, both before and after testosterone suppression. No methodology has been previously devised to make meaningful measurements.” (2) This statement was not accurate at the time of publication, as there are innumerable publications with validated methodology for comparing physical fitness and/or athletic performance between people of different ages, sexes, and before and after medical treatment, any of which could easily have been used with minimal or no adaptation for the purposes of this study. Indeed, well before the publication of Harper (2015), several authors that I have cited in this review had performed and published disciplined and methodologically reliable studies of physical performance and physiological attributes “before and after” testosterone suppression.

143. More recently, and to her credit, Harper has acknowledged the finding of Roberts (2020) regarding the durable male advantage in running speed in the 1.5 mile distance, even after two years of testosterone suppression. She joins with co-

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authors in acknowledging that this study of individuals who (due to Air Force physical fitness requirements) “could at least be considered exercise trained,” agrees that Roberts’ data shows that “transwomen ran significantly faster during the 1.5 mile fitness test than ciswomen,” and declares that this result is “consistent with the findings of the current review in untrained transgender individuals” that even 30 months of testosterone suppression does not eliminate all male advantages “associated with muscle endurance and performance.” (Harper 2021 at 8.) The Harper (2021) authors conclude overall “that strength may be well preserved in transwomen during the first 3 years of hormone therapy,” and that [w]hether transgender and cisgender women can engage in meaningful sport [in competition with each other], even after [testosterone suppression], is a highly debated question.” (Harper 2021 at 1, 8.)

144. Higerd (2021) “[a]ssess[ed] the probability of a girls’ champion being biologically male” by evaluating 920,11 American high school track and field performances available through the track and field database Athletic.net in five states (CA, FL, MN, NY, WA), over three years (2017 – 2019), in eight events; high jump, long jump, 100M, 200M, 400M, 800M, 1600M, and 3200M and estimated that “there is a simulated 81%-98% probability of transgender dominance occurring in the female track and field event” and further concluded that “in the majority of cases, the entire podium (top of the state) would be MTF [transgender athletes]” (at xii).

B. Testosterone suppression does not reverse important male physiological advantages.

145. We see that, once a male has gone through male puberty, later testosterone suppression (or even castration) leaves large strength and performance advantages over females in place. It is not surprising that this is so. What is now a fairly extensive body of literature has documented that many of the specific male physiological advantages that I reviewed in Section II are not reversed by testosterone suppression after puberty, or are reduced only modestly, leaving a large advantage over female norms still in place.

146. Handelsman has well documented that the large increases in physiological and performance advantages characteristic of men develop in tandem with, and are likely driven by, the rapid and large increases in circulating testosterone levels that males experience across puberty, or generally between the ages of about 12 through 18. (Handelsman 2018.) Some have misinterpreted Handelsman as suggesting that all of those advantages are and remain entirely dependent—on an ongoing basis—on *current* circulating testosterone levels. This is a misreading of Handelsman, who makes no such claim. As the studies reviewed above demonstrate, it is also empirically false with respect to multiple measures of

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performance. Indeed, Handelsman himself, referring to the Roberts et al. (2020) study which I describe below, has recently written that “transwomen treated with estrogens after completing male puberty experienced only minimal declines in physical performance over 12 months, substantially surpassing average female performance for up to 8 years.” (Handelsman 2020.)

147. As to individual physiological advantages, the more accurate and more complicated reality is reflected in a statement titled “The Role of Testosterone in Athletic Performance,” published in 2019 by several dozen sports medicine experts and physicians from many top medical schools and hospitals in the U.S. and around the world. (Levine et al. 2019.) This expert group concurs with Handelsman regarding the importance of testosterone to the male advantage, but recognizes that those advantages depend not only on *current* circulating testosterone levels in the individual, but on the “exposure in biological males to much higher levels of testosterone during growth, development, and throughout the athletic career.” (*Emphasis added.*) In other words, both past and current circulating testosterone levels affect physiology and athletic capability.

148. Available research enables us to sort out, in some detail, which specific physiological advantages are immutable once they occur, which can be reversed only in part, and which appear to be highly responsive to later hormonal manipulation. The bottom line is that very few of the male physiological advantages I have reviewed in Section II above are largely reversible by testosterone suppression once an individual has passed through male puberty.

Skeletal Configuration

149. It is obvious that some of the physiological changes that occur during “growth and development” across puberty cannot be reversed. Some of these irreversible physiological changes are quite evident in photographs that have recently appeared in the news of transgender competitors in female events. These include skeletal configuration advantages including:

- Longer and larger bones that give height, weight, and leverage advantages to men;
- More advantageous hip shape and configuration as compared to women.

Cardiovascular Advantages

150. Developmental changes for which there is no apparent means of reversal, and no literature suggesting reversibility, also include multiple

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contributors to the male cardiovascular advantage, including diaphragm placement, lung and trachea size, and heart size and therefore pumping capacity.¹²

151. On the other hand, the evidence is mixed as to hemoglobin concentration, which as discussed above is a contributing factor to VO_2 max. Harper (2021) surveyed the literature and found that “Nine studies reported the levels of Hgb [hemoglobin] or HCT [red blood cell count] in transwomen before and after [testosterone suppression], from a minimum of three to a maximum of 36 months post hormone therapy. Eight of these studies. . . found that hormone therapy led to a significant (4.6%–14.0%) decrease in Hgb/HCT ($p < 0.01$), while one study found no significant difference after 6 months,” but only one of those eight studies returned results at the generally accepted 95% confidence level. (Harper 2021 at 5-6 and Table 5.)

152. I have not found any study of the effect of testosterone suppression on the male advantage in mitochondrial biogenesis.

Muscle mass

153. Multiple studies have found that muscle mass decreases modestly or not at all in response to testosterone suppression. Knox et al. report that “healthy young men did not lose significant muscle mass (or power) when their circulating testosterone levels were reduced to 8.8 nmol/L (lower than the 2015 IOC guideline of 10 nmol/L) for 20 weeks.” (Knox 2019 at 398.) Gooren found that “[i]n spite of muscle surface area reduction induced by androgen deprivation, after 1 year the mean muscle surface area in male-to- female transsexuals remained significantly greater than in untreated female-to-male transsexuals.” (Gooren 2011 at 653.) An earlier study by Gooren found that after one year of testosterone suppression, muscle mass at the thigh was reduced by only about 10%, exhibited “no further reduction after 3 years of hormones,” and “remained significantly greater” than in his sample of untreated women. (Gooren 2004 at 426-427.) Van Caenegem et al. found that muscle cross section in the calf and forearm decreased only trivially (4% and 1% respectively) after two years of testosterone suppression. (Van Caenegem 2015 Table 4.)

154. Taking measurements one month after start of testosterone suppression in male-to-female (non-athlete) subjects, and again 3 and 11 months after start of feminizing hormone replacement therapy in these subjects, Wiik et al.

¹² “[H]ormone therapy will not alter ... lung volume or heart size of the transwoman athlete, especially if [that athlete] transitions postpuberty, so natural advantages including joint articulation, stroke volume and maximal oxygen uptake will be maintained.” (Knox 2019 at 398.)

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found that total lean tissue (i.e. primarily muscle) did not decrease significantly across the entire period. Indeed, “some of the [subjects] did not lose any muscle mass at all.” (Wiik 2020 at 812.) And even though they observed a small decrease in thigh muscle mass, they found that isometric strength levels measured at the knee “were maintained over the [study period].” (808) “At T12 [the conclusion of the one-year study], the absolute levels of strength and muscle volume were greater in [male-to-female subjects] than in [female-to-male subjects] and CW [women who had not undergone any hormonal therapy].” (808)

155. Hilton & Lundberg summarize an extensive survey of the literature as follows:

“12 longitudinal studies have examined the effects of testosterone suppression on lean body mass or muscle size in transgender women. The collective evidence from these studies suggests that 12 months, which is the most commonly examined intervention period, of testosterone suppression to female typical reference levels results in a modest (approximately– 5%) loss of lean body mass or muscle size. . . .

“Thus, given the large baseline differences in muscle mass between males and females (Table 1; approximately 40%), the reduction achieved by 12 months of testosterone suppression can reasonably be assessed as small relative to the initial superior mass. We, therefore, conclude that the muscle mass advantage males possess over females, and the performance implications thereof, are not removed by the currently studied durations (4 months, 1, 2 and 3 years) of testosterone suppression in transgender women. (Hilton 2021 at 205-207.)

156. When we recall that “women have 50% to 60% of men’s upper arm muscle cross-sectional area and 65% to 70% of men’s thigh muscle cross-sectional area” (Handelsman 2018 at 812), it is clear that Hilton’s conclusion is correct. In other words, biologically male subjects possess substantially larger muscles than biologically female subjects after undergoing a year or even three years of testosterone suppression.

157. I note that outside the context of transgender athletes, the testosterone-driven increase in muscle mass and strength enjoyed by these male-to-female subjects would constitute a disqualifying doping violation under all league anti-doping rules with which I am familiar.

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C. Responsible voices internationally are increasingly recognizing that suppression of testosterone in a male after puberty has occurred does not substantially reverse the male athletic advantage.

158. The previous very permissive NCAA policy governing transgender participation in women's collegiate athletics was adopted in 2011, and the previous IOC guidelines were adopted in 2015. At those dates, much of the scientific analysis of the actual impact of testosterone suppression had not yet been performed, much less any wider synthesis of that science. In fact, a series of important peer-reviewed studies and literature reviews have been published only very recently, since I prepared my first paper on this topic, in early 2020.

159. These new scientific publications reflect a remarkably consistent consensus: once an individual has gone through male puberty, testosterone suppression does not substantially eliminate the physiological and performance advantages that that individual enjoys over female competitors.

160. Importantly, I have found no peer-reviewed scientific paper, nor any respected scientific voice, that is now asserting the contrary—that is, that testosterone suppression can eliminate or even largely eliminate the male biological advantage once puberty has occurred.

161. I excerpt the key conclusions from important recent peer-reviewed papers below.

162. Roberts 2020: “In this study, we confirmed that . . . the pretreatment differences between transgender and cis gender women persist beyond the 12-month time requirement currently being proposed for athletic competition by the World Athletics and the IOC.” (6)

163. Wiik 2020: The muscular and strength changes in males undergoing testosterone suppression “were modest. The question of when it is fair to permit a transgender woman to compete in sport in line with her experienced gender identity is challenging.” (812)

164. Harper 2021: “[V]alues for strength, LBM [lean body mass], and muscle area in transwomen remain above those of cisgender women, even after 36 months of hormone therapy.” (1)

165. Hilton & Lundberg 2021: “evidence for loss of the male performance advantage, established by testosterone at puberty and translating in elite athletes to a 10–50% performance advantage, is lacking. . . . These data significantly

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undermine the delivery of fairness and safety presumed by the criteria set out in transgender inclusion policies . . .” (211)

166. Hamilton et al. 2020, “Response to the United Nations Human Rights Council’s Report on Race and Gender Discrimination in Sport: An Expression of Concern and a Call to Prioritize Research”: “There is growing support for the idea that development influenced by high testosterone levels may result in retained anatomical and physiological advantages If a biologically male athlete self-identifies as a female, legitimately with a diagnosis of gender dysphoria or illegitimately to win medals, the athlete already possesses a physiological advantage that undermines fairness and safety. This is not equitable, nor consistent with the fundamental principles of the Olympic Charter.”

167. Hamilton et al. 2021, “Consensus Statement of the Fédération Internationale de Médecine du Sport” (International Federation of Sports Medicine, or FIMS), signed by more than 60 sports medicine experts from prestigious institutions around the world: The available studies “make it difficult to suggest that the athletic capabilities of transwomen individuals undergoing HRT or GAS are comparable to those of cisgender women.” The findings of Roberts et al. “question the required testosterone suppression time of 12 months for transwomen to be eligible to compete in women’s sport, as most advantages over ciswomen were not negated after 12 months of HRT.”

168. Outside the forum of peer-reviewed journals, respected voices in sport are reaching the same conclusion.

169. The **Women’s Sports Policy Working Group** identifies among its members and “supporters” many women Olympic medalists, former women’s tennis champion and LGBTQ activist Martina Navratilova, Professor Doriane Coleman, a former All-American women’s track competitor, transgender athletes Joanna Harper and Dr. Renee Richards, and many other leaders in women’s sports and civil rights. I have referenced other published work of Joanna Harper and Professor Coleman. In early 2021 the Women’s Sports Policy Working Group published a “Briefing Book” on the issue of transgender participation in women’s sports,¹³ in which they reviewed largely the same body of literature I have reviewed above, and analyzed the implications of that science for fairness and safety in women’s sports.

170. Among other things, the Women’s Sports Policy Working Group concluded:

¹³ <https://womenssportspolicy.org/wp-content/uploads/2021/02/Congressional-Briefing-WSPWG-Transgender-Women-Sports-2.27.21.pdf>

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- “[T]he evidence is increasingly clear that hormones do not eliminate the legacy advantages associated with male physical development” (8) due to “the considerable size and strength advantages that remain even after hormone treatments or surgical procedures.” (17)
- “[T]here is convincing evidence that, depending on the task, skill, sport, or event, trans women maintain male sex-linked (legacy) advantages even after a year on standard gender-affirming hormone treatment.” (26, citing Roberts 2020.)
- “[S]everal peer-reviewed studies, including one based on data from the U.S. military, have confirmed that trans women retain their male sex-linked advantages even after a year on gender affirming hormones. . . . Because of these retained advantages, USA Powerlifting and World Rugby have recently concluded that it isn't possible fairly and safely to include trans women in women's competition.” (32)

171. As has been widely reported, in 2020, after an extensive scientific consultation process, the **World Rugby** organization issued its Transgender Guidelines, finding that it would not be consistent with fairness or safety to permit biological males to compete in World Rugby women's matches, no matter what hormonal or surgical procedures they might have undergone. Based on their review of the science, World Rugby concluded:

- “Current policies regulating the inclusion of transgender women in sport are based on the premise that reducing testosterone to levels found in biological females is sufficient to remove many of the biologically-based performance advantages described above. However, peer-reviewed evidence suggests that this is not the case.”
- “Longitudinal research studies on the effect of reducing testosterone to female levels for periods of 12 months or more do not support the contention that variables such as mass, lean mass and strength are altered meaningfully in comparison to the original male-female differences in these variables. The lowering of testosterone removes only a small proportion of the documented biological differences, with large, retained advantages in these physiological attributes, with the safety and performance implications described previously.”
- “. . . given the size of the biological differences prior to testosterone suppression, this comparatively small effect of testosterone reduction allows substantial and meaningful differences to remain. This has significant implications for the risk of injury”

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- “. . . bone mass is typically maintained in transgender women over the course of at least 24 months of testosterone suppression, Height and other skeletal measurements such as bone length and hip width have also not been shown to change with testosterone suppression, and nor is there any plausible biological mechanism by which this might occur, and so sporting advantages due to skeletal differences between males and females appear unlikely to change with testosterone reduction.

172. In September 2021 the government-commissioned Sports Councils of the United Kingdom and its subsidiary parts (the five Sports Councils responsible for supporting and investing in sport across England, Wales, Scotland and Northern Ireland) issued a formal “Guidance for Transgender Inclusion in Domestic Sport” (UK Sport Councils 2021), following an extensive consultation process, and a commissioned “International Research Literature Review” prepared by the Carbmill Consulting group (UK Sport Literature Review 2021). The UK Sport Literature Review identified largely the same relevant literature that I review in this paper, characterizes that literature consistently with my own reading and description, and based on that science reaches conclusions similar to mine.

173. The UK Sport Literature Review 2021 concluded:

- “Sexual dimorphism in relation to sport is significant and the most important determinant of sporting capacity. The challenge to sporting bodies is most evident in the inclusion of transgender people in female sport.” “[The] evidence suggests that parity in physical performance in relation to gender-affected sport cannot be achieved for transgender people in female sport through testosterone suppression. Theoretical estimation in contact and collision sport indicate injury risk is likely to be increased for female competitors.” (10)
- “From the synthesis of current research, the understanding is that testosterone suppression for the mandated one year before competition will result in little or no change to the anatomical differences between the sexes, and a more complete reversal of some acute phase metabolic pathways such as haemoglobin levels although the impact on running performance appears limited, and a modest change in muscle mass and strength: The average of around 5% loss of muscle mass and strength will not reverse the average 40-50% difference in strength that typically exists between the two sexes.” (7)
- “These findings are at odds with the accepted intention of current policy in sport, in which twelve months of testosterone suppression is

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expected to create equivalence between transgender women and females.” (7)

174. Taking into account the science detailed in the UK Sport Literature Review 2021, the UK Sports Councils have concluded:

- “[T]he latest research, evidence and studies made clear that there are retained differences in strength, stamina and physique between the average woman compared with the average transgender woman or non-binary person registered male at birth, with or without testosterone suppression.” (3)
- “Competitive fairness cannot be reconciled with self-identification into the female category in gender-affected sport.” (7)
- “As a result of what the review found, the Guidance concludes that the inclusion of transgender people into female sport cannot be balanced regarding transgender inclusion, fairness and safety in gender-affected sport where there is meaningful competition. This is due to retained differences in strength, stamina and physique between the average woman compared with the average transgender woman or non-binary person assigned male at birth, with or without testosterone suppression.” (6)
- “Based upon current evidence, testosterone suppression is unlikely to guarantee fairness between transgender women and natal females in gender-affected sports. . . . Transgender women are on average likely to retain physical advantage in terms of physique, stamina, and strength. Such physical differences will also impact safety parameters in sports which are combat, collision or contact in nature.” (7)

175. On January 15, 2022 the American Swimming Coaches Association (ASCA) issued a statement stating, “The American Swimming Coaches Association urges the NCAA and all governing bodies to work quickly to update their policies and rules to maintain fair competition in the women’s category of swimming. ASCA supports following all available science and evidenced-based research in setting the new policies, and we strongly advocate for more research to be conducted” and further stated “The current NCAA policy regarding when transgender females can compete in the women’s category can be unfair to cisgender females and needs to be reviewed and changed in a transparent manner.” (<https://swimswam.com/asca-issues-statement-calling-for-ncaa-to-review-transgender-rules/>; Accessed January 16, 2022.)

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176. On January 19, 2022, the NCAA Board of Governors approved a change to the policy on transgender inclusion in sport and stated that “...the updated NCAA policy calls for transgender participation for each sport to be determined by the policy for the national governing body of that sport, subject to ongoing review and recommendation by the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports to the Board of Governors. If there is no N[atational]G[overning]B[ody] policy for a sport, that sport's international federation policy would be followed. If there is no international federation policy, previously established IOC policy criteria would be followed” (<https://www.ncaa.org/news/2022/1/19/media-center-board-of-governors-updates-transgender-participation-policy.aspx>; Accessed January 20, 2022.)

177. On February 1, 2022, because “...a competitive difference in the male and female categories and the disadvantages this presents in elite head-to-head competition ... supported by statistical data that shows that the top-ranked female in 2021, on average, would be ranked 536th across all short course yards (25 yards) male events in the country and 326th across all long course meters (50 meters) male events in the country, among USA Swimming members,” USA Swimming released its Athlete Inclusion, Competitive Equity and Eligibility Policy. The policy is intended to “provide a level-playing field for elite cisgender women, and to mitigate the advantages associated with male puberty and physiology.” (USA Swimming Releases Athlete Inclusion, Competitive Equity and Eligibility Policy, available at <https://www.usaswimming.org/news/2022/02/01/usa-swimming-releases-athlete-inclusion-competitive-equity-and-eligibility-policy>.) The policy states:

- For biologically male athletes seeking to compete in the female category in certain “elite” level events, the athlete has the burden of demonstrating to a panel of independent medical experts that:
 - “From a medical perspective, the prior physical development of the athlete as Male, as mitigated by any medical intervention, does not give the athlete a competitive advantage over the athlete’s cisgender Female competitors” and
 - There is a presumption that the athlete is not eligible unless the athlete “demonstrates that the concentration of testosterone in the athlete’s serum has been less than 5 nmol/L . . . continuously for a period of at least thirty-six (36) months before the date of the Application.” This presumption may be rebutted “if the Panel finds, in the unique circumstances of the case, that [the athlete’s prior physical development does not give the athlete a competitive advantage] notwithstanding the athlete’s serum testosterone results (e.g., the athlete has a medical condition

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which limits bioavailability of the athlete's free testosterone)." (USA Swimming Athlete Inclusion Procedures at 43.)

Conclusions

The research and actual observed data show the following:

- At the level of (a) elite, (b) collegiate, (c) scholastic, and (d) recreational competition, men, adolescent boys, or male children, have an advantage over equally gifted, aged and trained women, adolescent girls, or female children in almost all athletic events;
- Biological male physiology is the basis for the performance advantage that men, adolescent boys, or male children have over women, adolescent girls, or female children in almost all athletic events; and
- The administration of androgen inhibitors and cross-sex hormones to men or adolescent boys after the onset of male puberty does not eliminate the performance advantage that men and adolescent boys have over women and adolescent girls in almost all athletic events. Likewise, there is no published scientific evidence that the administration of puberty blockers to males before puberty eliminates the pre-existing athletic advantage that prepubertal males have over prepubertal females in almost all athletic events.

For over a decade sports governing bodies (such as the IOC and NCAA) have wrestled with the question of transgender inclusion in female sports. The previous policies implemented by these sporting bodies had an underlying "premise that reducing testosterone to levels found in biological females is sufficient to remove many of the biologically-based performance advantages." (World Rugby 2020 at 13.) Disagreements centered around what the appropriate threshold for testosterone levels must be—whether the 10nmol/liter value adopted by the IOC in 2015, or the 5nmol/liter value adopted by the IAAF.

But the science that has become available within just the last few years contradicts that premise. Instead, as the UK Sports Councils, World Rugby, the FIMS Consensus Statement, and the Women's Sports Policy Working Group have all recognized the science is now sharply "at odds with the accepted intention of current policy in sport, in which twelve months of testosterone suppression is expected to create equivalence between transgender women and females" (UK Sports Literature Review 2021 at 7), and it is now "difficult to suggest that the athletic capabilities of transwomen individuals undergoing HRT or GAS are comparable to those of cisgender women." (Hamilton, FIMS Consensus Statement 2021.) It is important to note that while the 2021 "IOC Framework on Fairness,

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Inclusion, and Non-Discrimination on the Basis of Gender Identity and Sex Variations” calls for an “evidence-based approach,” that Framework does not actually reference *any* of the now extensive scientific evidence relating to the physiological differences between the sexes, and the inefficacy of hormonal intervention to eliminate male advantages relevant to most sports. Instead, the IOC calls on other sporting bodies to define criteria for transgender inclusion, while demanding that such criteria simultaneously ensure fairness, safety, and inclusion for all. The recently updated NCAA policy on transgender participation also relies on other sporting bodies to establish criteria for transgender inclusion while calling for fair competition and safety.

But what we currently know tells us that these policy goals—fairness, safety, and full transgender inclusion—are irreconcilable for many or most sports. Long human experience is now joined by large numbers of research papers that document that males outperform females in muscle strength, muscular endurance, aerobic and anaerobic power output, VO₂max, running speed, swimming speed, vertical jump height, reaction time, and most other measures of physical fitness and physical performance that are essential for athletic success. The male advantages have been observed in fitness testing in children as young as 3 years old, with the male advantages increasing immensely during puberty. To ignore what we know to be true about males’ athletic advantages over females, based on mere hope or speculation that cross sex hormone therapy (puberty blockers, androgen inhibitors, or cross-sex hormones) might neutralize that advantage, when the currently available evidence says it does not, is not science and is not “evidence-based” policy-making.

Because of the recent research and analysis in the general field of transgender athletics, many sports organizations have revised their policies or are in the process of doing so. As a result, there is not any universally recognized policy among sports organizations, and transgender inclusion policies are in a state of flux, likely because of the increasing awareness that the goals of fairness, safety, and full transgender inclusion are irreconcilable.

Sports have been separated by sex for the purposes of safety and fairness for a considerable number of years. The values of safety and fairness are endorsed by numerous sports bodies, including the NCAA and IOC. The existing evidence of durable physiological and performance differences based on biological sex provides a strong evidence-based rationale for keeping rules and policies for such sex-based separation in place (or implementing them as the case may be).

As set forth in detail in this report, there are physiological differences between males and females that result in males having a significant performance advantage over similarly gifted, aged, and trained females in nearly all athletic events before, during, and after puberty. There is not scientific evidence that any

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amount or duration of cross sex hormone therapy (puberty blockers, androgen inhibitors, or cross-sex hormones) eliminates all physiological advantages that result in males performing better than females in nearly all athletic events. Males who have received such therapy retain sufficient male physiological traits that enhance athletic performance vis-à-vis similarly aged females and are thus, from a physiological perspective, more accurately categorized as male and not female.

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Appendix 1 – Data Tables**Presidential Physical Fitness Results¹⁴****Curl-Ups (# in 1 minute)**

					Male-Female %		
Male		Female			Difference		
Age	50th %ile	85th %ile	50th %ile	85th %ile	Age	50th %ile	85th %ile
6	22	33	23	32	6	-4.3%	3.1%
7	28	36	25	34	7	12.0%	5.9%
8	31	40	29	38	8	6.9%	5.3%
9	32	41	30	39	9	6.7%	5.1%
10	35	45	30	40	10	16.7%	12.5%
11	37	47	32	42	11	15.6%	11.9%
12	40	50	35	45	12	14.3%	11.1%
13	42	53	37	46	13	13.5%	15.2%
14	45	56	37	47	14	21.6%	19.1%
15	45	57	36	48	15	25.0%	18.8%
16	45	56	35	45	16	28.6%	24.4%
17	44	55	34	44	17	29.4%	25.0%

¹⁴ This data is available from a variety of sources, including:
<https://gilmore.gvgsd.us/documents/Info/Forms/Teacher%20Forms/PresidentialchallengeTest.pdf>

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Shuttle Run (seconds)

Age	Male		Female		Age	Male-Female % Difference	
	50th %ile	85th %ile	50th %ile	85th %ile		50th %ile	85th %ile
6	13.3	12.1	13.8	12.4	6	3.6%	2.4%
7	12.8	11.5	13.2	12.1	7	3.0%	5.0%
8	12.2	11.1	12.9	11.8	8	5.4%	5.9%
9	11.9	10.9	12.5	11.1	9	4.8%	1.8%
10	11.5	10.3	12.1	10.8	10	5.0%	4.6%
11	11.1	10	11.5	10.5	11	3.5%	4.8%
12	10.6	9.8	11.3	10.4	12	6.2%	5.8%
13	10.2	9.5	11.1	10.2	13	8.1%	6.9%
14	9.9	9.1	11.2	10.1	14	11.6%	9.9%
15	9.7	9.0	11.0	10.0	15	11.8%	10.0%
16	9.4	8.7	10.9	10.1	16	13.8%	13.9%
17	9.4	8.7	11.0	10.0	17	14.5%	13.0%

1 mile run (seconds)

Age	Male		Female		Age	Male-Female % Difference	
	50th %ile	85th %ile	50th %ile	85th %ile		50th %ile	85th %ile
6	756	615	792	680	6	4.5%	9.6%
7	700	562	776	636	7	9.8%	11.6%
8	665	528	750	602	8	11.3%	12.3%
9	630	511	712	570	9	11.5%	10.4%
10	588	477	682	559	10	13.8%	14.7%
11	560	452	677	542	11	17.3%	16.6%
12	520	431	665	503	12	21.8%	14.3%
13	486	410	623	493	13	22.0%	16.8%
14	464	386	606	479	14	23.4%	19.4%
15	450	380	598	488	15	24.7%	22.1%
16	430	368	631	503	16	31.9%	26.8%
17	424	366	622	495	17	31.8%	26.1%

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Pull Ups (# completed)

Age	Male		Female		Age	Male-Female % Difference	
	50th %ile	85th %ile	50th %ile	85th %ile		50th %ile	85th %ile
6	1	2	1	2	6	0.0%	0.0%
7	1	4	1	2	7	0.0%	100.0%
8	1	5	1	2	8	0.0%	150.0%
9	2	5	1	2	9	100.0%	150.0%
10	2	6	1	3	10	100.0%	100.0%
11	2	6	1	3	11	100.0%	100.0%
12	2	7	1	2	12	100.0%	250.0%
13	3	7	1	2	13	200.0%	250.0%
14	5	10	1	2	14	400.0%	400.0%
15	6	11	1	2	15	500.0%	450.0%
16	7	11	1	1	16	600.0%	1000.0%
17	8	13	1	1	17	700.0%	1200.0%

Data Compiled from Athletic.Net

2021 National 3000 m cross country race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	691.8	728.4	Difference	607.7	659.8	Difference	608.1	632.6	Difference
2	722.5	739.0	#1 boy vs #	619.6	674.0	#1 boy vs #	608.7	639.8	#1 boy vs #
3	740.5	783.0	1 girl	620.1	674.7	1 girl	611.3	664.1	1 girl
4	759.3	783.5	5.0%	643.2	683.7	7.9%	618.6	664.4	3.9%
5	759.6	792.8		646.8	685.0		619.7	671.6	
6	760.0	824.1		648.0	686.4		631.2	672.1	
7	772.0	825.7	Average	648.8	687.0	Average	631.7	672.3	Average
8	773.0	832.3	difference	658.0	691.0	difference	634.9	678.4	difference
9	780.7	834.3	boys vs girls	659.5	692.2	boys vs girls	635.0	679.3	boys vs girls
10	735.1	844.4	6.2%	663.9	663.3	5.6%	635.1	679.4	6.3%

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2021 National 3000 m cross country race time in seconds

Rank	5 th grade			6 th grade			7 th grade		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	625.5	667.0	Difference	545.3	582.0	Difference	534.0	560.7	Difference
2	648.8	685.0	#1 boy vs #	553.2	584.3	#1 boy vs #	541.0	567.0	#1 boy vs #
3	653.5	712.9	1 girl	562.3	585.1	1 girl	542.6	581.8	1 girl
4	658.4	719.2	6.2%	562.9	599.8	6.3%	544.6	583.0	4.8%
5	675.3	725.2		571.5	612.9		546.0	595.0	
6	677.4	727.7		588.0	622.0		556.0	599.0	
7	677.6	734.0	Average	591.3	624.9	Average	556.0	604.3	Average
8	679.1	739.4	difference	593.0	626.0	difference	556.0	606.0	difference
9	686.4	739.4	boys vs girls	593.8	628.0	boys vs girls	558.6	606.8	boys vs girls
10	686.4	746.4	7.3%	594.1	645.6	5.8%	563.2	617.0	7.1%

2021 National 100 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	13.06	14.24	Difference #1	10.87	12.10	Difference #1	11.37	12.08	Difference #1
2	13.54	14.41	boy vs # 1	10.91	12.24	boy vs # 1	11.61	12.43	boy vs # 1
3	13.73	14.44	girl	11.09	12.63	girl	11.73	12.51	girl
4	14.10	14.48	8.3%	11.25	12.70	10.2%	11.84	12.55	5.9%
5	14.19	14.49		11.27	12.75		11.89	12.57	
6	14.31	14.58		11.33	12.80		11.91	12.62	
7	14.34	14.69	Average	11.42	12.83	Average	11.94	12.65	Average
8	14.35	14.72	difference	11.43	12.84	difference	11.97	12.71	difference
9	14.41	14.77	boys vs girls	11.44	12.88	boys vs girls	12.08	12.71	boys vs girls
10	14.43	14.86	3.6%	11.51	12.91	11.1%	12.12	12.75	5.7%

2021 National 200 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	24.02	28.72	Difference #1	21.77	25.36	Difference #1	20.66	25.03	Difference #1
2	24.03	28.87	boy vs # 1	22.25	25.50	boy vs # 1	22.91	25.18	boy vs # 1
3	28.07	29.92	girl	22.48	25.55	girl	23.14	25.22	girl
4	28.44	29.95	16.4%	22.57	25.70	14.2%	23.69	25.49	17.5%
5	28.97	30.04		22.65	26.08		23.84	25.78	
6	29.26	30.09		22.77	26.22		24.23	25.89	
7	29.34	30.27	Average	23.11	26.79	Average	24.35	26.03	Average
8	29.38	30.34	difference	23.16	26.84	difference	24.58	26.07	difference
9	29.65	30.41	boys vs girls	23.28	26.91	boys vs girls	24.59	26.10	boys vs girls
10	29.78	30.54	6.1%	23.47	26.85	13.1%	24.61	26.13	7.9%

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2021 National 400 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	66.30	67.12	Difference #1	49.29	56.80	Difference #1	51.96	55.70	Difference #1
2	66.88	67.67	boy vs # 1	50.47	58.57	boy vs # 1	55.52	57.08	boy vs # 1
3	67.59	67.74	girl	52.28	60.65	girl	55.58	57.60	girl
4	68.16	68.26	1.2%	52.44	61.45	13.2%	55.59	57.79	6.7%
5	68.51	68.37		53.31	61.81		55.72	58.02	
6	69.13	71.02		53.65	62.03		55.84	58.25	
7	69.75	72.73	Average	53.78	62.32	Average	55.92	59.25	Average
8	69.80	73.25	difference	54.51	62.33	difference	57.12	59.27	difference
9	69.81	73.31	boys vs girls	55.84	62.34	boys vs girls	57.18	59.40	boys vs girls
10	70.32	73.48	2.4%	55.90	62.40	13.0%	57.22	59.49	4.2%

2021 National 800 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	152.2	157.9	Difference #1	120.8	141.4	Difference #1	127.8	138.5	Difference #1
2	155.2	164.6	boy vs # 1	124.0	142.2	boy vs # 1	129.7	143.1	boy vs # 1
3	161.0	164.9	girl	125.1	148.8	girl	130.5	144.2	girl
4	161.1	165.9	3.6%	125.6	151.3	14.5%	133.2	144.2	7.7%
5	161.2	168.5		126.5	151.6		136.2	144.9	
6	161.6	169.9		136.5	152.5		136.5	145.0	
7	161.8	171.5	Average	137.1	153.1	Average	136.7	145.2	Average
8	162.2	173.1	difference	138.5	153.7	difference	136.7	145.6	difference
9	165.3	173.4	boys vs girls	139.5	153.8	boys vs girls	137.0	145.6	boys vs girls
10	166.9	174.7	4.5%	140.2	154.2	12.6%	137.9	145.8	6.9%

2021 National 1600 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	372.4	397.6	Difference #1	307.4	319.3	Difference #1	297.3	313.8	Difference #1
2	378.3	400.9	boy vs # 1	313.7	322.2	boy vs # 1	298.4	317.1	boy vs # 1
3	378.4	405.6	girl	315.0	322.6	girl	307.0	319.9	girl
4	402.0	435.2	6.3%	318.2	337.5	3.7%	313.9	323.3	5.2%
5	406.4	445.0		318.4	345.2		319.2	325.3	
6	413.4	457.0		320.5	345.7		320.4	326.2	
7	457.4	466.0	Average	327.0	345.9	Average	321.1	327.0	Average
8	473.3	466.8	difference	330.3	347.1	difference	321.9	330.0	difference
9	498.3	492.3	boys vs girls	333.4	347.5	boys vs girls	325.5	331.1	boys vs girls
10	505.0	495.0	4.0%	347.0	355.6	4.7%	327.1	332.5	2.9%

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2021 National 3000 m Track race time in seconds

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	794.2	859.9	Difference #1	602.3	679.2	Difference #1	556.6	623.7	Difference #1
2	856.3		boy vs # 1	644.9	709.7	boy vs # 1	591.6	649.5	boy vs # 1
3			girl	646.6	714.2	girl	600.8	651.6	girl
4			7.6%	648.2	741.9	11.3%	607.1	654.9	10.8%
5				648.4	742.7		609.1	662.9	
6	No further data	No Further Data		652.8	756.6		611.5	664.1	
7			Average	658.9	760.2	Average	615.7	666.3	Average
8			difference	660.1	762.5	difference	617.3	666.8	difference
9			boys vs girls	662.7	780.2	boys vs girls	618.4	673.2	boys vs girls
10			NA%	671.6	792.3	12.7%	620.6	674.4	8.2%

2021 National Long Jump Distance (in inches)

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	156.0	176.0	Difference #1	256.8	213.8	Difference #1	224.0	201.3	Difference #1
2	156.0	163.8	boy vs # 1	247.0	212.0	boy vs # 1	222.5	197.3	boy vs # 1
3	155.0	153.0	girl	241.0	210.8	girl	220.5	195.8	girl
4	154.3	152.0	-11.4%	236.3	208.8	20.1%	210.3	193.5	11.3%
5	154.0	149.5		231.5	207.0		210.0	193.3	
6	152.8	146.0		225.0	204.8		206.8	192.5	
7	151.5	144.5	Average	224.0	194.5	Average	206.0	192.3	Average
8	150.8	137.5	difference	224.0	192.5	difference	205.5	192.0	difference
9	150.5	137.0	boys vs girls	221.8	192.3	boys vs girls	205.0	191.3	boys vs girls
10		No	1.4%			13.2%			9.1%
	150.5	Further Data		219.0	187.5		204.5	189.0	

2021 National High Jump Distance (in inches)

Rank	7-8 years old			9-10 years old			11-12 year old		
	Boys	Girls		Boys	Girls		Boys	Girls	
1	38.0	37.5	Difference #1	72.0	58.0	Difference #1	63.0	56.0	Difference #1
2	38.0	34.0	boy vs # 1	70.0	58.0	boy vs # 1	61.0	56.0	boy vs # 1
3	36.0	32.0	girl	65.8	57.0	girl	60.0	57.0	girl
4	36.0	32.0	1.3	62.0	56.0	24.1%	59.0	56.0	12.5%
5	35.8	32.0		62.0	56.0		59.0	56.0	
6	35.5			62.0	55.0		59.0	55.0	
7	34.0	No further Data	Average	61.0	54.0	Average	59.0	54.0	Average
8	32.0		difference	60.0	54.0	difference	58.0	54.0	difference
9	59.0		boys vs girls	59.0	No	boys vs girls	57.8	56.0	boys vs girls
			21.6%		Further	12.5%			6.9%
10	56.0			56.0	Data		57.8	56.0	

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Appendix 2 – Scholarly Publications in Past 10 Years

Refereed Publications

1. Brown GA, Shaw BS, Shaw I. How much water is in a mouthful, and how many mouthfuls should I drink? A laboratory exercise to help students understand developing a hydration plan. *Adv Physiol Educ* 45: 589–593, 2021.
2. Schneider KM and Brown GA (as Faculty Mentor). What's at Stake: Is it a Vampire or a Virus? *International Journal of Undergraduate Research and Creative Activities*. 11, Article 4. 2019.
3. Christner C and Brown GA (as Faculty Mentor). Explaining the Vampire Legend through Disease. *UNK Undergraduate Research Journal*. 23(1), 2019. (*This is an on-campus publication.)
4. Schneekloth B and Brown GA. Comparison of Physical Activity during Zumba with a Human or Video Game Instructor. 11(4):1019-1030. *International Journal of Exercise Science*, 2018.
5. Bice MR, Hollman A, Bickford S, Bickford N, Ball JW, Wiedenman EM, Brown GA, Dinkel D, and Adkins M. Kinesiology in 360 Degrees. *International Journal of Kinesiology in Higher Education*, 1: 9-17, 2017
6. Shaw I, Shaw BS, Brown GA, and Shariat A. Review of the Role of Resistance Training and Musculoskeletal Injury Prevention and Rehabilitation. *Gavin Journal of Orthopedic Research and Therapy*. 1: 5-9, 2016
7. Kahle A, Brown GA, Shaw I, & Shaw BS. Mechanical and Physiological Analysis of Minimalist versus Traditionally Shod Running. *J Sports Med Phys Fitness*. 56(9):974-9, 2016
8. Bice MR, Carey J, Brown GA, Adkins M, and Ball JW. The Use of Mobile Applications to Enhance Learning of the Skeletal System in Introductory Anatomy & Physiology Students. *Int J Kines Higher Educ* 27(1) 16-22, 2016
9. Shaw BS, Shaw I, & Brown GA. Resistance Exercise is Medicine. *Int J Ther Rehab*. 22: 233-237, 2015.
10. Brown GA, Bice MR, Shaw BS, & Shaw I. Online Quizzes Promote Inconsistent Improvements on In-Class Test Performance in Introductory Anatomy & Physiology. *Adv. Physiol. Educ*. 39: 63-6, 2015
11. Brown GA, Heiserman K, Shaw BS, & Shaw I. Rectus abdominis and rectus femoris muscle activity while performing conventional unweighted and weighted seated abdominal trunk curls. *Medicina dello Sport*. 68: 9-18. 2015
12. Botha DM, Shaw BS, Shaw I & Brown GA. Role of hyperbaric oxygen therapy in the promotion of cardiopulmonary health and rehabilitation. *African Journal for*

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Physical, Health Education, Recreation and Dance (AJPHERD). Supplement 2 (September), 20: 62-73, 2014

13. Abbey BA, Heelan KA, Brown, GA, & Bartee RT. Validity of HydraTrend™ Reagent Strips for the Assessment of Hydration Status. J Strength Cond Res. 28: 2634-9. 2014
14. Scheer KC, Siebrandt SM, Brown GA, Shaw BS, & Shaw I. Wii, Kinect, & Move. Heart Rate, Oxygen Consumption, Energy Expenditure, and Ventilation due to Different Physically Active Video Game Systems in College Students. International Journal of Exercise Science: 7: 22-32, 2014
15. Shaw BS, Shaw I, & Brown GA. Effect of concurrent aerobic and resistive breathing training on respiratory muscle length and spirometry in asthmatics. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). Supplement 1 (November), 170-183, 2013
16. Adkins M, Brown GA, Heelan K, Ansorge C, Shaw BS & Shaw I. Can dance exergaming contribute to improving physical activity levels in elementary school children? African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). 19: 576-585, 2013
17. Jarvi MB, Brown GA, Shaw BS & Shaw I. Measurements of Heart Rate and Accelerometry to Determine the Physical Activity Level in Boys Playing Paintball. International Journal of Exercise Science: 6: 199-207, 2013
18. Brown GA, Krueger RD, Cook CM, Heelan KA, Shaw BS & Shaw I. A prediction equation for the estimation of cardiorespiratory fitness using an elliptical motion trainer. West Indian Medical Journal. 61: 114-117, 2013.
19. Shaw BS, Shaw I, & Brown GA. Body composition variation following diaphragmatic breathing. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). 18: 787-794, 2012.

Refereed Presentations

1. Brown GA. Transwomen competing in women's sports: What we know, and what we don't. American Physiological Society New Trends in Sex and Gender Medicine conference. Held virtually due to Covid-19 pandemic. October 19 - 22, 2021, 2021.
2. Shaw BS, Boshoff VE, Coetzee S, Brown GA, Shaw I. A Home-based Resistance Training Intervention Strategy To Decrease Cardiovascular Disease Risk In Overweight Children Med Sci Sport Exerc. 53(5), 742. 68th Annual Meeting of the American College of Sports Medicine. Held virtually due to Covid-19 pandemic. June 1-5, 2021.
3. Shaw I, Cronje M, Brown GA, Shaw BS. Exercise Effects On Cognitive Function And Quality Of Life In Alzheimer's Patients In Long-term Care. Med

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- Sci Sport Exerc. 53(5), 743. 68th Annual Meeting of the American College of Sports Medicine. Held virtually due to Covid-19 pandemic. June 1-5, 2021.
4. Brown GA, Escalera M, Oleena A, Turek T, Shaw I, Shaw BS. Relationships between Body Composition, Abdominal Muscle Strength, and Well Defined Abdominal Muscles. Med Sci Sport Exerc. 53(5), 197. 68th Annual Meeting of the American College of Sports Medicine. Held virtually due to Covid-19 pandemic. June 1-5, 2021.
 5. Brown GA, Jackson B, Szekely B, Schramm T, Shaw BS, Shaw I. A Pre-Workout Supplement Does Not Improve 400 M Sprint Running or Bicycle Wingate Test Performance in Recreationally Trained Individuals. Med Sci Sport Exerc. 50(5), 2932. 65th Annual Meeting of the American College of Sports Medicine. Minneapolis, MN. June 2018.
 6. Paulsen SM, Brown GA. Neither Coffee Nor A Stimulant Containing “Pre-workout” Drink Alter Cardiovascular Drift During Walking In Young Men. Med Sci Sport Exerc. 50(5), 2409. 65th Annual Meeting of the American College of Sports Medicine. Minneapolis, MN. June 2018.
 7. Adkins M, Bice M, Bickford N, Brown GA. Farm to Fresh! A Multidisciplinary Approach to Teaching Health and Physical Activity. 2018 spring SHAPE America central district conference. Sioux Falls, SD. January 2018.
 8. Shaw I, Kinsey JE, Richards R, Shaw BS, and Brown GA. Effect Of Resistance Training During Nebulization In Adults With Cystic Fibrosis. International Journal of Arts & Sciences’ (IJAS). International Conference for Physical, Life and Health Sciences which will be held at FHWien University of Applied Sciences of WKW, at Währinger Gürtel 97, Vienna, Austria, from 25-29 June 2017.
 9. Bongers M, Abbey BM, Heelan K, Steele JE, Brown GA. Nutrition Education Improves Nutrition Knowledge, Not Dietary Habits In Female Collegiate Distance Runners. Med Sci Sport Exerc. 49(5), 389. 64th Annual Meeting of the American College of Sports Medicine. Denver, CO. May 2017.
 10. Brown GA, Steele JE, Shaw I, Shaw BS. Using Elisa to Enhance the Biochemistry Laboratory Experience for Exercise Science Students. Med Sci Sport Exerc. 49(5), 1108. 64th Annual Meeting of the American College of Sports Medicine. Denver, CO. May 2017.
 11. Brown GA, Shaw BS, and Shaw I. Effects of a 6 Week Conditioning Program on Jumping, Sprinting, and Agility Performance In Youth. Med Sci Sport Exerc. 48(5), 3730. 63rd Annual Meeting of the American College of Sports Medicine. Boston, MA. June 2016.
 12. Shaw I, Shaw BS, Boshoff VE, Coetzee S, and Brown GA. Kinanthropometric Responses To Callisthenic Strength Training In Children. Med Sci Sport Exerc.

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- 48(5), 3221. 63rd Annual Meeting of the American College of Sports Medicine. Boston, MA. June 2016.
13. Shaw BS, Shaw I, Gouveia M, McIntyre S, and Brown GA. Kinanthropometric Responses To Moderate-intensity Resistance Training In Postmenopausal Women. *Med Sci Sport Exerc.* 48(5), 2127. 63rd Annual Meeting of the American College of Sports Medicine. Boston, MA. June 2016.
 14. Bice MR, Cary JD, Brown GA, Adkins M, and Ball JW. The use of mobile applications to enhance introductory anatomy & physiology student performance on topic specific in-class tests. National Association for Kinesiology in Higher Education National Conference. January 8, 2016.
 15. Shaw I, Shaw BS, Lawrence KE, Brown GA, and Shariat A. Concurrent Resistance and Aerobic Exercise Training Improves Hemodynamics in Normotensive Overweight and Obese Individuals. *Med Sci Sport Exerc.* 47(5), 559. 62nd Annual Meeting of the American College of Sports Medicine. San Diego, CA. May 2015.
 16. Shaw BS, Shaw I, McCrorie C, Turner S., Schnetler A, and Brown GA. Concurrent Resistance and Aerobic Training in the Prevention of Overweight and Obesity in Young Adults. *Med Sci Sport Exerc.* 47(5), 223. 62nd Annual Meeting of the American College of Sports Medicine. San Diego, CA. May 2015.
 17. Schneekloth B, Shaw I, Shaw BS, and Brown GA. Physical Activity Levels Using Kinect™ Zumba Fitness versus Zumba Fitness with a Human Instructor. *Med Sci Sport Exerc.* 46(5), 326. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL. June 2014.
 18. Shaw I, Lawrence KE, Shaw BS, and Brown GA. Callisthenic Exercise-related Changes in Body Composition in Overweight and Obese Adults. *Med Sci Sport Exerc.* 46(5), 394. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.
 19. Shaw BS, Shaw I, Fourie M, Gildenhuis M, and Brown GA. Variances In The Body Composition Of Elderly Woman Following Progressive Mat Pilates. *Med Sci Sport Exerc.* 46(5), 558. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.
 20. Brown GA, Shaw I, Shaw BS, and Bice M. Online Quizzes Enhance Introductory Anatomy & Physiology Performance on Subsequent Tests, But Not Examinations. *Med Sci Sport Exerc.* 46(5), 1655. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.
 21. Kahle, A. and Brown, G.A. Electromyography in the Gastrocnemius and Tibialis Anterior, and Oxygen Consumption, Ventilation, and Heart Rate During Minimalist versus Traditionally Shod Running. 27th National Conference on Undergraduate Research (NCUR). La Crosse, Wisconsin USA. April 11-13, 2013

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22. Shaw, I., Shaw, B.S., and Brown, G.A. Resistive Breathing Effects on Pulmonary Function, Aerobic Capacity and Medication Usage in Adult Asthmatics Med Sci Sports Exerc 45 (5). S1602 2013. 60th Annual Meeting of the American College of Sports Medicine, Indianapolis, IN USA, May 26-30 2013
23. Shaw, B.S. Gildenhuis, G.A., Fourie, M. Shaw I, and Brown, G.A. Function Changes In The Aged Following Pilates Exercise Training. Med Sci Sports Exerc 45 (5). S1566 60th Annual Meeting of the American College of Sports Medicine, Indianapolis, IN USA, May 26-30 2013
24. Brown, G.A., Abbey, B.M., Ray, M.W., Shaw B.S., & Shaw, I. Changes in Plasma Free Testosterone and Cortisol Concentrations During Plyometric Depth Jumps. Med Sci Sports Exerc 44 (5). S598, 2012. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California
25. Shaw, I., Fourie, M., Gildenhuis, G.M., Shaw B.S., & Brown, G.A. Group Pilates Program and Muscular Strength and Endurance Among Elderly Woman. Med Sci Sports Exerc 44 (5). S1426. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California
26. Shaw B.S., Shaw, I., & Brown, G.A. Concurrent Inspiratory-Expiratory and Aerobic Training Effects On Respiratory Muscle Strength In Asthmatics. Med Sci Sports Exerc 44 (5). S2163. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California
27. Scheer, K., Siebrandt, S., Brown, G.A, Shaw B.S., & Shaw, I. Heart Rate, Oxygen Consumption, and Ventilation due to Different Physically Active Video Game Systems. Med Sci Sports Exerc 44 (5). S1763. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California
28. Jarvi M.B., Shaw B.S., Shaw, I., & Brown, G.A. (2012) Paintball Is A Blast, But Is It Exercise? Heart Rate and Accelerometry In Boys Playing Paintball. Med Sci Sports Exerc 44 (5). S3503. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

Book Chapters

1. Shaw BS, Shaw I, Brown G.A. Importance of resistance training in the management of cardiovascular disease risk. In Cardiovascular Risk Factors. IntechOpen, 2021.

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2. Brown, G.A. Chapters on Androstenedione and DHEA. In: Nutritional Supplements in Sport, Exercise and Health an A-Z Guide. edited by Linda M. Castell, Samantha J. Stear, Louise M. Burke. Routledge 2015.

Refereed Web Content

1. Brown GA. Looking back and moving forward. The importance of reflective assessment in physiology education. (January 13, 2022)
<https://blog.lifescitrc.org/pecop/2022/01/13/looking-back-and-moving-forward-the-importance-of-reflective-assessment-in-physiology-education/>
2. Brown GA. The Olympics, sex, and gender in the physiology classroom. Physiology Educators Community of Practice, managed by the Education group of the American Physiological Society (August 18, 2021)
<https://blog.lifescitrc.org/pecop/2021/08/18/the-olympics-sex-and-gender-in-the-physiology-classroom/>

A complete CV is available at

https://www.unk.edu/academics/hperls/bio_pages/current-vita-gab.pdf